

FOR OFFICIAL USE ONLY

VOLUME III  
APPENDICES

*INVESTIGATION  
OF  
THE POTENTIAL  
FOR  
INCREASED USE  
OF  
CIVILIAN  
MANNING  
IN FLEET SUPPORT SHIPS  
CIVMAN*



FINAL REPORT

FOR OFFICIAL USE ONLY

AN (1) AD-A058 150  
FG (2) 050900  
FG (2) 150600  
CI (3) (U)  
CA (5) INFORMATION SPECTRUM INC ARLINGTON VA  
TI (6) Investigation of the Potential for Increased Use of  
Civilian Manning in Fleet Support Ships. Volume III.  
Appendices.  
TC (8) (U)  
DN (9) Final rept.,  
AU (10) Rhode, Alfred S.  
AU (10) Grenetz, Philip  
AU (10) Davis, Lewis E.  
AU (10) Mattheis, William G.  
AU (10) Tucker, James F. , Jr  
RD (11) Feb 1978  
PG (12) 444p  
CT (15) N00014-77-C-0116  
RC (20) Unclassified report  
NO (21) See also Volume 1, AD-A058 148.  
DE (23) \*Civilian personnel, Naval personnel, Ship personnel,  
Economic analysis, Manpower utilization, Costs,  
Operation, Risk, Tables(Data), Comparison, Maintenance,  
Repair, Supplies, Test and evaluation, Naval vessels  
DC (24) (U)  
ID (25) Fleet supports, Contract personnel  
IC (26) (U)  
AB (27) This study was undertaken at the request of the Deputy  
Chief of Naval Operations (Logistics) to examine the  
cost, manpower and operational aspects of the increased  
use of civilian manning aboard the U.S. Navy's fleet  
support ship forces. The evaluation and comparison of  
the two manning alternatives, Navy Civil Service  
manning and Commercial Contract manning, with Navy  
Military manning were conducted with respect to the  
following key factors: Manpower requirements; Manpower  
costs; Total Ship operating cost (including maintenance  
and overhaul costs); Mission fulfillment capability;  
Operating policy; Risks; Total fleet and Merchant  
Marine labor market effect; and Alternative Operating  
Concepts. This report does not reach conclusions or  
make recommendations; but rather is intended to present  
documented findings to be considered by decision makers  
along with military, national security and economic  
judgements in determining direction and scope for  
further action. (Author)  
AC (28) (U)  
DL (33) 01  
SE (34) F1

INVESTIGATION OF THE POTENTIAL  
FOR INCREASED USE OF CIVILIAN  
MANNING IN FLEET SUPPORT SHIPS

VOLUME III

APPENDICES

Alfred S. Rhode, PhD.  
Lewis Davis, Jr.  
William G. Mattheis  
Philip Grenetz  
James F. Tucker, Jr.

Information Spectrum, Inc.  
1745 S. Jefferson Davis Highway  
Arlington, Virginia 22202

Prepared for:

The Systems Analysis Division (OP-96)  
Office of the Chief of Naval Operations  
under  
ONR Contract Number N00014-77-C-0016

Enclosure (1) to CNO LTR  
SER 96/S590196

## FOREWORD

The CIVMAN study examined the costs, risks, capabilities and benefits of manning Navy fleet support ships, alternatively, with Navy Civil Service Mariners and commercial contract mariners. This examination, made at a time of severe fiscal constraint and a potential future military manpower shortfall, is one of several alternatives being evaluated in the Navy's total force evaluation. Other alternatives include the assignment of women to sea duty and use of naval reserves to augment reduced Navy military ships.

ISI gratefully acknowledges the assistance of the Working Group Members, the many people in the Office of the Chief of Naval Operations, Naval Sea Systems Command, the Military Sealift Command and the U.S. Maritime Administration. We are especially indebted to Mr. Irving Blickstein, (OP-964C), the Project Officer, for his constant advice; and CAPT Raymond Helms, USN for his counsel during the conduct of the study. Commanders William Dietrich and Edward Brewton, USN, were particularly helpful in assisting the Working Group with their commentary on points of view that invariably surfaced during the course of the study. We also wish to acknowledge the very able assistance of Mr. Kenneth Hylind, Ms. Betty Ferreira, Mr. Dudley J. Clapp, Jr., and Mr. Louis Tippet of the Military Sealift Command, as well as Mr. Arthur Friedberg, Mr. Thomas Connors and Ms. Esther Love of the U.S. Maritime Administration.



## SUMMARY

A total of 95 fleet support ships were considered, including underway replenishment, repair, towing, salvage, and submarine rescue ships. The study covered the three manning alternatives with respect to the following factors:

- a. Operating Policy;
- b. Manpower Requirements;
- c. Manpower Costs;
- d. Total Ship Operating Costs (including maintenance, overhaul, and reconfiguration costs);
- e. Effect on Mission Fulfillment Capability;
- f. Risks to the Navy; and
- g. Total Fleet and Merchant Marine Labor Market Effect.

The major findings of the study include:

a. Navy military manning has the highest manning requirement. Navy Civil Service and commercial contract manning are roughly equivalent--differences exist because of estimating techniques rather than differing requirements.

b. Navy Civil Service manning is always the least-cost alternative, with annual amortized per ship, per year savings of from \$.2M to \$4.6M. (Expressed in FY-77 dollars, based upon a modified life cycle cost analysis with SCN costs omitted.)

c. Both civilian manning options will result in a reduction in capability (e.g., no CIC, no AAW, reduced damage control, fewer UNREP stations).

d. Both civilian manning options increase the risk to the Navy. Although the risk is difficult to quantify, and in some cases is only perceived, the study summarized it as follows:

(1) Military Control - reduced in civilian manned ships.

(2) Stability of Work Force - potential advantage in civilian options because over time, a large cadre of specially trained civilian personnel with fleet support experience would be available in time of a contingency.

(3) Manpower Availability - at the time of the study there was a civilian manpower surplus; currently there are spot shortages, i.e., diesel engineers.

(4) Age of Sailors - civilian mariners older (average age 48)--however, more experienced in basic maritime skills. Experience level could fall if a large number of ships were transferred over a short period.

(5) Ability to Maintain the Ship - no discernible difference based on MSC operation of 13 fleet support ships.

(6) Legal - personal services contracting and Government liability under commercial contract manning option might require legislation.

(7) Potential Strike Threat - Past performance indicates that a strike is improbable. A "no-strike" agreement might be obtainable.

(8) Endurance - small Navy Civil Service and commercial contract crews result in a reduced ability to meet increased operating tempo conditions during a contingency.

e. The study reports that if all 95 ships studied were converted to Navy Civil Service manning:

(1) The cost savings to the Navy would be \$271M per year (economic costs) if the assumed civilian manning levels are acceptable. The savings, however, are based on a quick survey of one representative ship of each type, and the assumption that the civilian manning levels are acceptable. These savings would diminish if crew sizes increase to provide greater capability or if reconfiguration/overhaul conversion costs are understated.

(2) This would transfer 11,873 jobs to the Civil Service sector.

(3) This could reduce a total of 27,000 Navy billets. Similar figures are derived for commercial contract manning.

The CIVMAN study provided adequate information on civilian operation of fleet support ships in a peacetime environment. It did not, however, adequately address the following items critical during a war or contingency:

a. Crew Endurance - The smaller civilian crews proposed in this study would have difficulty in maintaining round-the clock operations. Fatigue and loss of stamina in such operations would directly affect fleet combatant vulnerability during underway replenishment operations.

b. Many ship functions are lost when a ship is demilitarized. As a result, a civilian manned ship experiences such reduced capabilities as lack of combat information center, lack of anti-air warfare defense, limited damage control, reduced ability to conduct high tempo task group operations, and fewer UNREP stations than are currently specified in the Required Operational Capabilities.

c. With the limited ammunition and nuclear weapon security projected in the study, vulnerability to terrorist activity may increase.

While some of the reduced capability, outlined above, can be restored with additional civilian or military manpower, such a crew increase could have an impact upon reconfiguration cost and on manpower costs. A cost analysis, similar to that performed in the study, would be required to determine the impact of any change in the capabilities of these ships.

In conclusion, the study provides the Navy with an excellent baseline for consideration of increased civilian manning. However, this study must be considered in conjunction with the developing concepts for assignment of women to sea duty and the use of naval reserves to augment Navy manning to ensure a complete perspective for decision formulation. Additionally, the significance of the reduced endurance of civilian crews and the loss of ship functions which are critical during war or contingency situations, as well as the other previously noted considerations, must be evaluated.

## TABLE OF CONTENTS

VOLUME I -- EXECUTIVE SUMMARY

VOLUME II -- NARRATIVE

VOLUME III -- APPENDICES

VOLUME IV -- CLASSIFIED APPENDICES

	<u>PAGE</u>
FOREWORD . . . . .	i
SUMMARY . . . . .	ii
TABLE OF CONTENTS . . . . .	v
LIST OF TABLES . . . . .	viii
LIST OF FIGURES . . . . .	xxiii
REPRESENTATIVE SHIP DATA TABLES IN CIVMAN REPORT . .	xxiv
STUDY DIRECTIVE AND STUDY PLAN . . . . .	xxvi

### VOLUME III - APPENDICES

#### APPENDIX A: MANPOWER REQUIREMENTS AND COST ANALYSIS

A. Manpower Requirements Analysis . . . . .	A-1
B. Reduced Navy Military Ship Manning . . . . .	A-71
1. AOE Class . . . . .	A-71
2. AE Class . . . . .	A-76
C. Manpower Cost Analyses -- Navy Military Manning .	A-79
D. Manpower Cost Analyses -- Navy Civil Service Manning . . . . .	A-101
E. Manpower Cost Analyses -- Commercial Contract Manning . . . . .	A-133

#### APPENDIX B: TOTAL COST ANALYSIS

A. Introduction . . . . .	B-1
B. FYDP Cost Analysis . . . . .	B-2
1. Navy Military Manning . . . . .	B-4
2. Navy Civil Service Manning . . . . .	B-12
3. Commercial Contract Manning . . . . .	B-36
C. Economic Cost Analyses . . . . .	B-62
1. Navy Military Manning . . . . .	B-62
2. Navy Civil Service Manning . . . . .	B-82
3. Commercial Contract Manning . . . . .	B-84

## TABLE OF CONTENTS (Cont.)

	<u>PAGE</u>
 APPENDIX C: FLEET SUPPORT POLICIES ANALYSIS	
A. General . . . . .	C-1
B. Communications Capabilities . . . . .	C-2
C. Defense Capabilities . . . . .	C-7
D. Maintenance . . . . .	C-7
E. Training . . . . .	C-9
F. Deployment Cycles . . . . .	C-10
G. Navy Military Personnel . . . . .	C-11
H. New Civilian Jobs Created . . . . .	C-13
 APPENDIX D: OPERATIONAL RISKS	
A. Introduction . . . . .	D-1
B. Military Control . . . . .	D-1
C. Stability of the Civilian Work Force. . . . .	D-5
D. Manpower Availability . . . . .	D-6
E. Legal Implications . . . . .	D-11
F. Navy Career Management Implications . . . . .	D-14
G. Ship Habitability Impact . . . . .	D-17
H. Endurance . . . . .	D-19
 APPENDIX E: MISSION CAPABILITIES ANALYSIS	
A. Purpose . . . . .	E-1
B. Methodology . . . . .	E-1
C. Mission Areas . . . . .	E-2
D. Projected Operational Environment (POE) Statements . . . . .	E-4
E. Required Operational Capabilities (ROC) Statement . . . . .	E-7
F. Findings . . . . .	E-10
G. Loss of Capability . . . . .	E-10
H. Effectiveness of MLSF Ships . . . . .	E-14
I. Comparison of AO and TAO Effectiveness . . . . .	E-15
1. Data . . . . .	E-16
2. Measures Employed . . . . .	E-18
3. Availability Analysis . . . . .	E-20
4. Productivity Analysis . . . . .	E-21
5. Results . . . . .	E-24
J. Wartime Transition . . . . .	E-24
 APPENDIX F: REDUCED OPERATING STATUS (ROS) ANALYSIS FOR MLSF SHIPS	
A. Introduction . . . . .	F-1
1. Background . . . . .	F-1
2. The ROS Concept . . . . .	F-2



## TABLE OF CONTENTS (Cont.)

	<u>PAGE</u>
B. Discussion . . . . .	F-2
1. Readiness Criteria . . . . .	F-2
2. Ship Keeping Requirements . . . . .	F-3
C. Assumptions . . . . .	F-5
1. Representative Ships . . . . .	F-5
2. ROS Cases . . . . .	F-5
a. All Civilian Manned MLSF . . . . .	F-6
b. Civilian/Navy Manned MLSF . . . . .	F-6
3. Navy Civil Service Manning (ROS) Assumptions . . . . .	F-9
4. Commercial Contract Manning (ROS) Assumptions . . . . .	F-13
D. Manpower Requirements . . . . .	F-16
E. Results of Cost Analysis . . . . .	F-20

### APPENDIX G: LEGAL ASPECTS OF INCREASED CIVILIAN MANNING OF U.S. NAVY FLEET SUPPORT SHIPS

A. Background . . . . .	G-1
B. Legal Status of U.S. Citizens Employed in U.S. Navy Fleet Support Ships in Direct Support of Military Operations . . . . .	G-1
C. Legal Impediments to Employing Contract Seamen Aboard Non U.S. Coast Guard Certified Fleet Support Ships Operated Under Contract . . . . .	G-2
D. Legal Aspects of Disciplinary Control In Civilian Manned Ships . . . . .	G-3

### LIST OF MEMORANDUMS

TAB A: Legal Status of U.S. Citizens Employed in U.S. Navy Fleet Support Ships in Direct Support of Military Operations . . . . .	G-4
TAB B: Contract Option of Fleet Support Ships . . . . .	G-8
TAB C: Feasibility of Civilian Manning for Fleet Support Ships . . . . .	G-20
TAB D: Civilian Manning of Fleet Support Ships Not Certified by the Coast Guard . . . . .	G-22
TAB E: A Comparison of the Disciplinary Control Over Personnel Aboard Fleet Support Ships Under Alternative Modes of Operation . . . . .	G-29
TAB F: Disciplinary Control of the Coast Guard Over Personnel Aboard Fleet Support Ships Under Alternative Modes of Operation . . . . .	G-41

### APPENDIX H: REFERENCES

References . . . . .	H-1
----------------------	-----

# LIST OF TABLES

<u>TABLES</u>	<u>PAGE</u>
A-1 Civilian/Navy Shipboard Organization Cross Reference . . . . .	A-2
A-2 Manpower Requirements Comparison -- Support Ship Fleet Manning Alternatives . . . . .	A-3
A-3 Manpower Requirements Summary (Navy Military Manning) AF-58 . . . . .	A-4
A-4 Manpower Requirements Summary (Navy Military Manning) AFS-3 . . . . .	A-5
A-5 Manpower Requirements Summary (Navy Military Manning) AOR-4 . . . . .	A-6
A-6 Manpower Requirements Summary (Navy Military Manning) AOE-3 . . . . .	A-7
A-7 Manpower Requirements Summary (Navy Military Manning) AE-28 . . . . .	A-8
A-8 Manpower Requirements Summary (Navy Military Manning) AO-177 . . . . .	A-9
A-9 Manpower Requirements Summary (Navy Military Manning) AD-37 . . . . .	A-10
A-10 Manpower Requirements Summary (Navy Military Manning) AS-36 . . . . .	A-11
A-11 Manpower Requirements Summary (Navy Military Manning) AR-6 . . . . .	A-12
A-12 Manpower Requirements Summary (Navy Military Manning) ARS-41 . . . . .	A-13
A-13 Manpower Requirements Summary (Navy Military Manning) ASR-22 . . . . .	A-14
A-14 Manpower Requirements Summary (Navy Military Manning) ATF-166 . . . . .	A-15
A-15 Manpower Requirements Summary (Navy Military Manning) ATS-1 . . . . .	A-16

# LIST OF TABLES (Cont.)

<u>TABLES</u>	<u>PAGE</u>
A-16 Manpower Requirements Summary (Navy Civil Service Personnel) AF-58 . . . . .	A-18
A-17 Manpower Requirements Summary (Navy Civil Service Personnel) AFS-3 . . . . .	A-19
A-18 Manpower Requirements Summary (Navy Civil Service Personnel) AOR-4 . . . . .	A-20
A-19 Manpower Requirements Summary (Navy Civil Service Personnel) AOE-3 . . . . .	A-21
A-20 Manpower Requirements Summary (Navy Civil Service Personnel) AE-28 . . . . .	A-22
A-21 Manpower Requirements Summary (Navy Civil Service Personnel) AO-177 . . . . .	A-23
A-22 Manpower Requirements Summary (Navy Civil Service Personnel) AD-37 . . . . .	A-24
A-23 Manpower Requirements Summary (Navy Civil Service Personnel) AS-36 . . . . .	A-25
A-24 Manpower Requirements Summary (Navy Civil Service Personnel) AR-6 . . . . .	A-26
A-25 Manpower Requirements Summary (Navy Civil Service Personnel) ARS-41 . . . . .	A-27
A-26 Manpower Requirements Summary (Navy Civil Service Personnel) ASR-22 . . . . .	A-28
A-27 Manpower Requirements Summary (Navy Civil Service Personnel) ATF-166 . . . . .	A-29
A-28 Manpower Requirements Summary (Navy Civil Service Personnel) ATS-1 . . . . .	A-30
A-29 Manpower Requirements Summary (Military Detachment - Navy Civil Service Manning) AF-58 . . .	A-31
A-30 Manpower Requirements Summary (Military Detachment - Navy Civil Service Manning) AFS-3 . . .	A-32
A-31 Manpower Requirements Summary (Military Detachment - Navy Civil Service Manning) AOR-4 . . .	A-33

# LIST OF TABLES (Cont.)

<u>TABLES</u>	<u>PAGE</u>
A-32 Manpower Requirements Summary (Military Detachment - Navy Civil Service Manning) AOE-3 . . .	A-34
A-33 Manpower Requirements Summary (Military Detachment - Navy Civil Service Manning) AE-28 . . .	A-35
A-34 Manpower Requirements Summary (Military Detachment - Navy Civil Service Manning) AO-177 . . .	A-36
A-35 Manpower Requirements Summary (Military Detachment - Navy Civil Service Manning) AD-37 . . .	A-37
A-36 Manpower Requirements Summary (Military Detachment - Navy Civil Service Manning) AS-36 . . .	A-38
A-37 Manpower Requirements Summary (Military Detachment - Navy Civil Service Manning) AR-6 . . . .	A-39
A-38 Manpower Requirements Summary (Military Detachment - Navy Civil Service Manning) ARS-41 . . .	A-40
A-39 Manpower Requirements Summary (Military Detachment - Navy Civil Service Manning) ASR-22 . . .	A-41
A-40 Manpower Requirements Summary (Military Detachment - Navy Civil Service Manning) ATF-166 . .	A-42
A-41 Manpower Requirements Summary (Military Detachment - Navy Civil Service Manning) ATS-1 . . .	A-43
A-42 Manpower Requirements Summary (Union Personnel-Commercial Contract Manning) AF-58 . . . . .	A-44
A-43 Manpower Requirements Summary (Union Personnel-Commercial Contract Manning) AFS-3 . . . . .	A-45
A-44 Manpower Requirements Summary (Union Personnel-Commercial Contract Manning) AOR-4 . . . . .	A-46
A-45 Manpower Requirements Summary (Union Personnel-Commercial Contract Manning) AOE-3 . . . . .	A-47
A-46 Manpower Requirements Summary (Union Personnel-Commercial Contract Manning) AE-28 . . . . .	A-48
A-47 Manpower Requirements Summary (Union Personnel-Commercial Contract Manning) AO-177 . . . . .	A-49

# LIST OF TABLES (Cont.)

<u>TABLES</u>	<u>PAGE</u>
A-48 Manpower Requirements Summary (Union Personnel- Commercial Contract Manning) AD-37 . . . . .	A-50
A-49 Manpower Requirements Summary (Union Personnel- Commercial Contract Manning) AS-36 . . . . .	A-51
A-50 Manpower Requirements Summary (Union Personnel- Commercial Contract Manning) AR-6 . . . . .	A-52
A-51 Manpower Requirements Summary (Union Personnel- Commercial Contract Manning) ARS-41 . . . . .	A-53
A-52 Manpower Requirements Summary (Union Personnel- Commercial Contract Manning) ASR-22 . . . . .	A-54
A-53 Manpower Requirements Summary (Union Personnel- Commercial Contract Manning) ATF-166 . . . . .	A-55
A-54 Manpower Requirements Summary (Union Personnel- Commercial Contract Manning) ATS-1 . . . . .	A-56
A-55 Manpower Requirements Summary (Military Detach- ment - Commercial Contract Manning) AF-58 . . .	A-57
A-56 Manpower Requirements Summary (Military Detach- ment - Commercial Contract Manning) AFS-3 . .	A-58
A-57 Manpower Requirements Summary (Military Detach- ment - Commercial Contract Manning) AOR-4 . .	A-59
A-58 Manpower Requirements Summary (Military Detach- ment - Commercial Contract Manning) AOE-3 . .	A-60
A-59 Manpower Requirements Summary (Military Detach- ment - Commercial Contract Manning) AE-28 . .	A-61
A-60 Manpower Requirements Summary (Military Detach- ment - Commercial Contract Manning) AO-177 . .	A-62
A-61 Manpower Requirements Summary (Military Detach- ment - Commercial Contract Manning) AD-37 . .	A-63
A-62 Manpower Requirements Summary (Military Detach- ment - Commercial Contract Manning) AS-36 . .	A-64
A-63 Manpower Requirements Summary (Military Detach- ment - Commercial Contract Manning) AR-6 . . .	A-65



# LIST OF TABLES (Cont.)

<u>TABLES</u>	<u>PAGE</u>
A-64 Manpower Requirements Summary (Military Detachment - Commercial Contract Manning) ARS-41 . .	A-66
A-65 Manpower Requirements Summary (Military Detachment - Commercial Contract Manning) ASR-22 . .	A-67
A-66 Manpower Requirements Summary (Military Detachment - Commercial Contract Manning) ATF-166 . .	A-68
A-67 Manpower Requirements Summary (Military Detachment - Commercial Contract Manning) ATS-1 . . .	A-69
A-68 Comparison of Navy Civil Service Manning Vis-a-Vis Navy Military Manning on AOE - Underway Ship and Engine Control . . . . .	A-73
A-69 Navy Military Manning on AOE Vis-a-Vis Navy Civil Service Manning . . . . .	A-75
A-70 AOE Class. Organizational Manpower Requirements, Revised Navy Military Vis-a-Vis Navy Civil Service Manning . . . . .	A-77
A-71 Manning Readiness Condition III Watch Navy/MSC Manpower Requirements AE 21/28 Class . . . . .	A-78
A-72 Comparison of Navy Military and Navy Civil Service Manpower Allocations to UNREP Stations Aboard AE-21 Class Ships . . . . .	A-80
A-73 Manpower Cost by Pay Grade . . . . .	A-82
A-74 Manpower Cost Analysis Summary (Navy Military Manning) AF-58 . . . . .	A-84
A-75 Manpower Cost Analysis Summary (Navy Military Manning) AFS-3 . . . . .	A-85
A-76 Manpower Cost Analysis Summary (Navy Military Manning) AOR-4 . . . . .	A-86
A-77 Manpower Cost Analysis Summary (Navy Military Manning) AOE-3 . . . . .	A-87
A-78 Manpower Cost Analysis Summary (Navy Military Manning) AE-28 . . . . .	A-88

# LIST OF TABLES (Cont.)

<u>TABLES</u>	<u>PAGE</u>
A-79 Manpower Cost Analysis Summary (Navy Military Manning) AO-177 . . . . .	A-89
A-80 Manpower Cost Analysis Summary (Navy Military Manning) AD-37 . . . . .	A-90
A-81 Manpower Cost Analysis Summary (Navy Military Manning) AS-36 . . . . .	A-91
A-82 Manpower Cost Analysis Summary (Navy Military Manning) AR-6 . . . . .	A-92
A-83 Manpower Cost Analysis Summary (Navy Military Manning) ARS-41 . . . . .	A-93
A-84 Manpower Cost Analysis Summary (Navy Military Manning) ASR-22 . . . . .	A-94
A-85 Manpower Cost Analysis Summary (Navy Military Manning) ATF-166 . . . . .	A-95
A-86 Manpower Cost Analysis Summary (Navy Military Manning) ATS-1 . . . . .	A-96
A-87 Manpower Cost Analysis Summary (Civilian Personnel - Navy Civil Service Manning) AF-58 . .	A-106
A-88 Manpower Cost Analysis Summary (Civilian Personnel - Navy Civil Service Manning) AFS-3 . .	A-107
A-89 Manpower Cost Analysis Summary (Civilian Personnel - Navy Civil Service Manning) AOR-4 . .	A-108
A-90 Manpower Cost Analysis Summary (Civilian Personnel - Navy Civil Service Manning) AOE-3 . .	A-109
A-91 Manpower Cost Analysis Summary (Civilian Personnel - Navy Civil Service Manning) AE-28 . .	A-110
A-92 Manpower Cost Analysis Summary (Civilian Personnel - Navy Civil Service Manning) AO-177 . .	A-111
A-93 Manpower Cost Analysis Summary (Civilian Personnel - Navy Civil Service Manning) AD-37 . .	A-112
A-94 Manpower Cost Analysis Summary (Civilian Personnel - Navy Civil Service Manning) AS-36 . .	A-113

# LIST OF TABLES (Cont.)

<u>TABLES</u>	<u>PAGE</u>
A-95 Manpower Cost Analysis Summary (Civilian Personnel - Navy Civil Service Manning) AR-6 . . .	A-114
A-96 Manpower Cost Analysis Summary (Civilian Personnel - Navy Civil Service Manning) ARS-41 . .	A-115
A-97 Manpower Cost Analysis Summary (Civilian Personnel - Navy Civil Service Manning) ASR-22 . .	A-116
A-98 Manpower Cost Analysis Summary (Civilian Personnel - Navy Civil Service Manning) ATF-166 .	A-117
A-99 Manpower Cost Analysis Summary (Civilian Personnel - Navy Civil Service Manning) ATS-1 . .	A-118
A-100 Manpower Cost Analysis Summary (Navy Military Detachment - Navy Civil Service Manning) AF-58 . . . . .	A-119
A-101 Manpower Cost Analysis Summary (Navy Military Detachment - Navy Civil Service Manning) AFS-3 . . . . .	A-120
A-102 Manpower Cost Analysis Summary (Navy Military Detachment - Navy Civil Service Manning) AOR-4 . . . . .	A-121
A-103 Manpower Cost Analysis Summary (Navy Military Detachment - Navy Civil Service Manning) AOE-3 . . . . .	A-122
A-104 Manpower Cost Analysis Summary (Navy Military Detachment - Navy Civil Service Manning) AE-28 . . . . .	A-123
A-105 Manpower Cost Analysis Summary (Navy Military Detachment - Navy Civil Service Manning) AO-177 . . . . .	A-124
A-106 Manpower Cost Analysis Summary (Navy Military Detachment - Navy Civil Service Manning) AD-37 . . . . .	A-125
A-107 Manpower Cost Analysis Summary (Navy Military Detachment - Navy Civil Service Manning) AS-36 . . . . .	A-126

# LIST OF TABLES (Cont.)

<u>TABLES</u>	<u>PAGE</u>
A-108 Manpower Cost Analysis Summary (Navy Military Detachment - Navy Civil Service Manning) AR-6 . . . . .	A-127
A-109 Manpower Cost Analysis Summary (Navy Military Detachment - Navy Civil Service Manning) ARS-41 . . . . .	A-128
A-110 Manpower Cost Analysis Summary (Navy Military Detachment - Navy Civil Service Manning) ASR-22 . . . . .	A-129
A-111 Manpower Cost Analysis Summary (Navy Military Detachment - Navy Civil Service Manning) ATF-166 . . . . .	A-130
A-112 Manpower Cost Analysis Summary (Navy Military Detachment - Navy Civil Service Manning) ATS-1 . . . . .	A-131
A-113 Manpower Cost Analysis Summary (Total Ship Annual Manpower Cost - Navy Civil Service Manning) . . . . .	A-132
A-114 Manpower Cost Analysis Summary (Civilian Personnel - Commercial Contract Manning) AF-58 . . . . .	A-134
A-115 Manpower Cost Analysis Summary (Civilian Personnel - Commercial Contract Manning) AFS-3 . . . . .	A-135
A-116 Manpower Cost Analysis Summary (Civilian Personnel - Commercial Contract Manning) AOR-4 . . . . .	A-136
A-117 Manpower Cost Analysis Summary (Civilian Personnel - Commercial Contract Manning) AOE-3 . . . . .	A-137
A-118 Manpower Cost Analysis Summary (Civilian Personnel - Commercial Contract Manning) AE-28 . . . . .	A-138
A-119 Manpower Cost Analysis Summary (Civilian Personnel - Commercial Contract Manning) AO-177 . . . . .	A-139

# TABLE OF CONTENTS (Cont.)

<u>TABLES</u>	<u>PAGE</u>
A-120 Manpower Cost Analysis Summary (Civilian Personnel - Commercial Contract Manning) AD-37 . . . . .	A-140
A-121 Manpower Cost Analysis Summary (Civilian Personnel - Commercial Contract Manning) AS-36 . . . . .	A-141
A-122 Manpower Cost Analysis Summary (Civilian Personnel - Commercial Contract Manning) AR-6 . . . . .	A-142
A-123 Manpower Cost Analysis Summary (Civilian Personnel - Commercial Contract Manning) ARS-41 . . . . .	A-143
A-124 Manpower Cost Analysis Summary (Civilian Personnel - Commercial Contract Manning) ASR-22 . . . . .	A-144
A-125 Manpower Cost Analysis Summary (Civilian Personnel - Commercial Contract Manning) ATF-166 . . . . .	A-145
A-126 Manpower Cost Analysis Summary (Civilian Personnel - Commercial Contract Manning) ATS-1 . . . . .	A-146
A-127 Manpower Cost Analysis Summary (Navy Military Detachment - Commercial Contract Manning) AF-58 . . . . .	A-147
A-128 Manpower Cost Analysis Summary (Navy Military Detachment - Commercial Contract Manning) AFS-3 . . . . .	A-148
A-129 Manpower Cost Analysis Summary (Navy Military Detachment - Commercial Contract Manning) AOR-4 . . . . .	A-149
A-130 Manpower Cost Analysis Summary (Navy Military Detachment - Commercial Contract Manning) AOE-3 . . . . .	A-150
A-131 Manpower Cost Analysis Summary (Navy Military Detachment - Commercial Contract Manning) AE-28 . . . . .	A-151



# LIST OF TABLES (Cont.)

<u>TABLES</u>	<u>PAGE</u>
A-132 Manpower Cost Analysis Summary (Navy Military Detachment - Commercial Contract Manning) AO-177 . . . . .	A-152
A-133 Manpower Cost Analysis Summary (Navy Military Detachment - Commercial Contract Manning) AD-37 . . . . .	A-153
A-134 Manpower Cost Analysis Summary (Navy Military Detachment - Commercial Contract Manning) AS-36 . . . . .	A-154
A-135 Manpower Cost Analysis Summary (Navy Military Detachment - Commercial Contract Manning) AR-6 . . . . .	A-155
A-136 Manpower Cost Analysis Summary (Navy Military Detachment - Commercial Contract Manning) ARS-41 . . . . .	A-156
A-137 Manpower Cost Analysis Summary (Navy Military Detachment - Commercial Contract Manning) ASR-22 . . . . .	A-157
A-138 Manpower Cost Analysis Summary (Navy Military Detachment - Commercial Contract Manning) ATF-166 . . . . .	A-158
A-139 Manpower Cost Analysis Summary (Navy Military Detachment - Commercial Contract Manning) ATS-1 . . . . .	A-159
B-1 Representative Ship Classes . . . . .	B-3
B-2 Annual Direct Personnel Cost Comparison . . . . .	B-5
B-3 Representative Peacetime Operating Scenarios (Annual Basis) . . . . .	B-9
B-4 Five Year Defense Program (FYDP) - Navy Military Manning. Ship Type: AF (Stores Ship) Cost Factors. Representative Ship AF-58 . . . ,	B-13
B-5 Five Year Defense Program (FYDP) - Navy Military Manning. Ship Type: AFS (Combat Store) Cost Factors. Representative Ship AFS-3 . . .	B-14

# LIST OF TABLES (Cont.)

<u>TABLES</u>	<u>PAGE</u>
B-6 Five Year Defense Program (FYDP) - Navy Military Manning. Ship Type: AOR (Replenishment Oiler) Cost Factors. Representative Ship AOR-4 . . . . .	B-15
B-7 Five Year Defense Program (FYDP) - Navy Military Manning. Ship Type: AOE (Fast Combat Support) Cost Factors. Representative Ship AOE-3 . . . . .	B-16
B-8 Five Year Defense Program (FYDP) - Navy Military Manning. Ship Type: AE (Ammunition Ship) Cost Factors. Representative Ship AE-28 . . .	B-17
B-9 Five Year Defense Program (FYDP) - Navy Military Manning. Ship Type: AO (Fleet Oiler) Cost Factors. Representative Ship AO-177 . . .	B-18
B-10 Five Year Defense Program (FYDP) - Navy Military Manning. Ship Type: AD (Destroyer Tender) Cost Factors. Representative Ship AD-37 . . .	B-19
B-11 Five Year Defense Program (FYDP) - Navy Military Manning. Ship Type: AS (Submarine Tender) Cost Factors. Representative Ship AS-36 . . .	B-20
B-12 Five Year Defense Program (FYDP) - Navy Military Manning. Ship Type: AR (Heavy Repair ship) Cost Factors. Representative Ship AR-6 .	B-21
B-13 Five Year Defense Program (FYDP) - Navy Military Manning. Ship Type: ARS (Salvage Ship) Cost Factors. Representative Ship ARS-41 . . .	B-22
B-14 Five Year Defense Program (FYDP) - Navy Military Manning. Ship Type: ASR (Salvage and Rescue) Cost Factors. Representative Ship ASR-22 . . . . .	B-23
B-15 Five Year Defense Program (FYDP) - Navy Military Manning. Ship Type: ATF (Towing Ship) Cost Factors. Representative Ship ATF-166 . .	B-24
B-16 Five Year Defense Program (FYDP) - Navy Military Manning. Ship Type: ATS (Towing & Salvage) Cost Factors. Representative Ship ATS-1 . . .	B-25

# LIST OF TABLES (Cont.)

<u>TABLES</u>	<u>PAGE</u>
B-17 Five Year Defense Program - Navy Civil Service Manning. Ship Type: AF (Stores Ship) Cost Factors. Representative Ship AF-58 . . .	B-37
B-18 Five Year Defense Program - Navy Civil Service Manning. Ship Type: AFS (Combat Store) Cost Factors. Representative Ship AFS-3 . . .	B-38
B-19 Five Year Defense Program - Navy Civil Service Manning. Ship Type: AOR (Replenishment Oiler) Cost Factors. Representative Ship AOR-4 . . .	B-39
B-20 Five Year Defense Program - Navy Civil Service Manning. Ship Type: AOE (Fast Combat Support) Cost Factors. Representative Ship AOE-3 . . .	B-40
B-21 Five Year Defense Program - Navy Civil Service Manning. Ship Type: AE (Ammunition Ship) Cost Factors. Representative Ship AE-28 . . .	B-41
B-22 Five Year Defense Program - Navy Civil Service Manning. Ship Type: AO (Fleet Oiler) Cost Factors. Representative Ship AO-177 . .	B-42
B-23 Five Year Defense Program - Navy Civil Service Manning. Ship Type: AO (Fleet Oiler) Cost Factors. Representative Ship AO-177. . .	B-43
B-24 Five Year Defense Program - Navy Civil Service Manning. Ship Type: AD (Destroyer Tender) Cost Factors. Representative Ship AD-37 . . .	B-44
B-25 Five Year Defense Program - Navy Civil Service Manning. Ship Type: AS (Submarine Tender) Cost Factors. Representative Ship AS-36 . . .	B-45
B-26 Five Year Defense Program - Navy Civil Service Manning. Ship Type: AR (Heavy Repair Ship) Cost Factors. Representative Ship AR-6 . . .	B-46
B-27 Five Year Defense Program - Navy Civil Service Manning. Ship Type: ARS (Salvage Ship) Cost Factors. Representative Ship ARS-41 . .	B-47
B-28 Five Year Defense Program - Navy Civil Service Manning. Ship Type: ASR (Salvage & Rescue) Cost Factors. Representative Ship ASR-22 . .	B-48

# LIST OF TABLES (Cont.)

<u>TABLES</u>	<u>PAGE</u>
B-29 Five Year Defense Program - Navy Civil Service Manning. Ship Type: ATF (Towing Ship) Cost Factors. Representative Ship ATF-166 . . .	B-49
B-30 Five Year Defense Program - Navy Civil Service Manning. Ship Type: ATS (Towing & Salvage) Cost Factors. Representative Ship ATS-1 . . .	B-50
B-31 Five Year Defense Program (FYDP) - Navy Commercial Contract Manning Cost Factors Ship Type: AF (Stores Ship) Representative Ship AF-58 . . . . .	B-62
B-32 Five Year Defense Program (FYDP) - Navy Commercial Contract Manning Cost Factors Ship Type: AFS (Combat Store) Representative Ship AFS-3 . . . . .	B-63
B-33 Five Year Defense Program (FYDP) - Navy Commercial Contract Manning Cost Factors Ship Type: AOR (Replenishment Oiler) Representative Ship AOR-4 . . . . .	B-64
B-34 Five Year Defense Program (FYDP) - Navy Commercial Contract Manning Cost Factors Ship Type: AOE (Fast Combat Support) Representative Ship AOE-3 . . . . .	B-65
B-35 Five Year Defense Program (FYDP) - Navy Commercial Contract Manning Cost Factors Ship Type: AE (Ammunition Ship) Representative Ship AE-28 . . . . .	B-66
B-36 Five Year Defense Program (FYDP) - Navy Commercial Contract Manning Cost Factors Ship Type: AO (Fleet Oiler) Representative Ship AO-177 . . . . .	B-67
B-37 Five Year Defense Program (FYDP) - Navy Commercial Contract Manning Cost Factors Ship Type: AO (Fleet Oiler) Representative Ship AO-177 . . . . .	B-68
B-38 Five Year Defense Program (FYDP) - Navy Commercial Contract Manning Cost Factors Ship Type: AD (Destroyer Tender) Representative Ship AD-37 . . . . .	B-69

# LIST OF TABLES (Cont.)

<u>TABLES</u>	<u>PAGE</u>
B-39 Five Year Defense Program (FYDP) - Navy Commercial Contract Manning Cost Factors Ship Type: AS (Submarine Tender) Representative Ship AS-36 . . . . .	B-70
B-40 Five Year Defense Program (FYDP) - Navy Commercial Contract Manning Cost Factors Ship Type: AR (Heavy Repair Ship) Representative Ship AR-6 . . . . .	B-71
B-41 Five Year Defense Program (FYDP) - Navy Commercial Contract Manning Cost Factors Ship Type: ARS (Salvage Ship) Representative Ship ARS-41 . . . . .	B-72
B-42 Five Year Defense Program (FYDP) - Navy Commercial Contract Manning Cost Factors Ship Type: ASR (Salvage & Rescue) Representative Ship ASR-22 . . . . .	B-73
B-43 Five Year Defense Program (FYDP) - Navy Commercial Contract Manning Cost Factors Ship Type: ATF (Towing Ship) Representative Ship ATF-166 . . . . .	B-74
B-44 Five Year Defense Program (FYDP) - Navy Commercial Contract Manning Cost Factors Ship Type: ATS (Towing & Salvage) Representative Ship ATS-1 . . . . .	B-75
C-1 Change in Navy Billet Requirements . . . . .	C-12
C-2 Civilian Billets and Personnel Required to Man the Active Support Fleet . . . . .	C-14
E-1 Primary (P) and Secondary (S) Mission Areas for Selected U.S. Navy Fleet Support Ships . .	E-3
E-2 MLSP Ships Limiting Period of UNREP Opera- tions (POE Statements) . . . . .	E-6
E-3 Fleet Support Ship Required Operational Capabilities Format . . . . .	E-8
E-4 Summary Comparison, Fleet Support Ship Opera- tional Capabilities, Navy Military Manning vs Civilian (Readiness Condition III) Manning . .	E-11



# LIST OF TABLES (Cont.)

<u>TABLES</u>	<u>PAGE</u>
E-5 Deliveries by Navy Oilers to Pacific Fleet Ships April 1976 through March 1977 . . . . .	E-17
E-6 Deliveries by Navy Oilers to Pacific Fleet Ships (Number of Underway Replenishments) . . .	E-19
E-7 Delivery Rates of Navy Oilers to Pacific Fleet Ships. November 1976 and March 1977 . . . . .	E-22
E-8 Deliveries by Navy Oilers to Pacific Fleet Ships . . . . .	E-25
F-1 Reduced Operating Status, ROS-Case I, Navy Civil Service or Commercial Contract Manning .	F-7
F-2 Reduced Operating Status, ROS-Case II, Navy Civil Service/Commercial Contract and Navy Military Manning . . . . .	F-8
F-3 Annual FYDP and Undiscounted Economic Costs Comparisons for Military Detachments Assigned to UNREP Shuttle Ships . . . . .	F-10
F-4 Unmanned Lay-up Costs . . . . .	F-14
F-5 Manpower Requirements Summary AFS-3 . . . . .	F-17
F-6 Manpower Requirements Summary AO-177 . . . . .	F-18
F-7 Manpower Requirements Summary AE-28 . . . . .	F-19
F-8 FYDP Cost Comparisons - Alternative Manning and Operating Cases - Navy Civil Service and Navy Military Manning . . . . .	F-21
F-9 FYDP Cost Comparisons - Alternative Manning and Operating Cases - Commercial Contract and Navy Military Manning . . . . .	F-24
F-10 Undiscounted Economic Cost Comparisons - Alternative Manning and Operating Cases - Navy Civil Service and Navy Military Manning . . . .	F-26
F-11 Undiscounted Economic Cost Comparison - Alter- native Manning and Operating Cases - Commercial Contract and Navy Military Manning . . . . .	F-28

## LIST OF FIGURES

<u>FIGURE</u>		<u>PAGE</u>
B-1	NARM Normalized MPN Equation . . . . .	B-7
F-1	Navy Civil Service Manned ROS Analysis for AE, AO, and AFS (Case I) . . . . .	F-12

REPRESENTATIVE SHIP DATA TABLES IN CIVMAN REPORT (Vols III & IV Appendices)

Data Table

Ship Type

	AOE	AOR	AFS	AF	AE	AO	AR	AS	AD	ARS	ASR	ATF	ATS
MANPOWER REQUIREMENTS - Navy Military Manning	A7	A6	A5	A4	A8	A9	A12	A11	A10	A13	A14	A15	A16
Navy Civil Service Manning - Civil Service Personnel	A21	A20	A19	A18	A22	A23	A26	A25	A24	A27	A28	A29	A30
Military Detachment	A34	A33	A32	A31	A35	A36	A39	A38	A37	A40	A41	A42	A43
Commercial Contract Manning - Civilian Personnel	A47	A46	A45	A44	A48	A49	A52	A51	A50	A53	A54	A55	A56
Military Detachment	A60	A59	A58	A57	A61	A62	A65	A64	A63	A66	A67	A68	A69
MANPOWER COSTS - Navy Military Manning	A87	A86	A85	A84	A88	A89	A92	A91	A90	A93	A94	A95	A96
Navy Civil Service Manning - Civil Service Personnel	A109	A108	A107	A106	A110	A111	A114	A113	A112	A115	A116	A117	A118
Military Detachment	A122	A121	A120	A119	A123	A124	A127	A126	A125	A128	A129	A130	A131
Commercial Contract Manning - Civilian Personnel	A137	A136	A135	A134	A138	A139	A142	A141	A140	A143	A144	A145	A146
Military Detachment	A150	A149	A148	A147	A151	A152	A155	A154	A153	A156	A157	A158	A159
TOTAL COST ANALYSIS - FYDP Cost	B16	B15	B14	B13	B17	B18	B21	B20	B19	B22	B23	B24	B25
Navy Military Manning	B40	B39	B38	B37	B41	B42	B46	B45	B44	B47	B48	B49	B50
Navy Civil Service Manning	B65	B64	B63	B62	B66	B67	B71	B70	B69	B72	B73	B74	B75
Commercial Contract Manning	C12	C12	C12	C12	C12	C12	C12	C12	C12	C12	C12	C12	C12
Change in Navy Billet Requirements	E3	E3	E3	E3	E3	E3	E3	E3	E3	E3	E3	E3	E3
MISSION CAPABILITY ANALYSIS	E6	E6	E6	E6	E6	E6	E6	E6	E6	E6	E6	E6	E6
Primary and Secondary Mission Areas	E11	E11	E11	E11	E11	E11	E11	E11	E11	E12	E12	E12	E12
MUSF Ships Limiting Period of UNREP Operations													
Summary Comparison Fleet Support Ship Operational Capabilities													

# REPRESENTATIVE SHIP DATA TABLES IN CIVMAN REPORT (Vols 3 & 4 Appendices)

Data Table

Ship Type

	AOE	AOR	AFS	AF	AE	AO	AR	AS	AD	ARS	ASR	ATF	ATS
REDUCED OPERATING STATUS (ROS) ANALYSIS FOR MLSF SHIPS													
ROS Case I			F7		F7	F7							
ROS Case II			F8		F8	F8							
Unmanned Lay-up Cost			F14		F14	F14							
Manpower Requirements Summary			F17		F19	F18							
ECONOMIC COSTS - Navy Military Manning													
Undiscounted	J1	J1	J1	J1	J1	J1	J2	J2	J2	J3	J3	J3	J3
Discounted	J4	J4	J4	J4	J4	J4	J5	J5	J5	J6	J6	J6	J6
Navy Civil Service Manning - Undiscounted	J8	J8	J8	J8	J8	J8	J9	J9	J9	J10	J10	J10	J10
Discounted	J11	J11	J11	J11	J11	J11	J12	J12	J12	J13	J13	J13	J13
Navy Commercial Contract Manning - Undiscounted	J15	J15	J15	J15	J15	J15	J16	J16	J16	J17	J17	J17	J17
Discounted	J18	J18	J18	J18	J18	J18	J19	J19	J19	J20	J20	J20	J20
MISSION FULFILLMENT CAPABILITIES	K13	K10	K7	K4	K16	K19	K28	K25	K22	K31	K34	K37	K40



DEPARTMENT OF THE NAVY  
OFFICE OF THE CHIEF OF NAVAL OPERATIONS  
WASHINGTON, D.C. 20350

IN REPLY REFER TO

Ser 96/589421

21 JAN 1977

From: Chief of Naval Operations  
To: Distribution List

Subj: Study Directive for the Increased Use of Civilian  
Manning on Fleet Support Ships

Ref: (a) CNO ltr Ser 96/S588959 of 4 Oct 1976 (CSTAP-77)

Encl: (1) Guidance for CNO Studies and Analysis  
(2) Working Group Manning Requirements

1. Title - Increased Use of Civilian Manning on Fleet Support Ships.
2. Type - CNO in-house study with contractor support.
3. Background - This study is being conducted at the request of the Deputy Chief of Naval Operations for Logistics to examine the cost, manpower and operational benefits which might be achieved from the increased use of civilian manning on Navy fleet support ships as specified in reference (a). The experimental Charger Log series for evaluating the efficiency of civilian-manned fleet oilers resulted in the assignment of eight AOs, four ATFs, two ARCs and one AF to MSC for Civil Service manning. The success in mission accomplishment and the manpower, maintenance and operations savings realized by these ships suggest that the potential for additional benefits from expanded use of civilian manning on fleet support ships should be explored. Civil Service mariner employment is attractive when compared to Military manning because of apparent manpower stability and return on training investment. It is attractive when compared to union mariners because of apparent greater personnel control and assurance of command authority in hostile situations. On the other hand, there are potential advantages to the U.S. Flag Merchant Marine in contract operation with union mariners which could benefit defense readiness or reduce costs in broadening the base of experience and by eventual substitution of privately procured and owned ships for ships now procured with Defense funds.
4. Objective - The study will determine the costs and benefits of alternative levels and ratings of civilian





manning and the consequent effects of each alternative on the actual numbers of USN/USNS/Charter ships for effective fleet support, both in peacetime and wartime.

5. Specific Guidance

a. Scope - The study shall investigate the feasibility and cost/benefits of alternatives for increased civilian manning in the following types of fleet support ships:  
AS - submarine tenders, AD - destroyer tenders,  
AE - ammunition ship, AF - store ship, AFS - combat stores ship, AO - oiler, AOE - fast combat support ship, AOR - replenishment oiler, AR - repair ship, ARS - salvage ship, ASR - submarine rescue ship, ATF - fleet ocean tug, and  
ATS - salvage tug.

b. Measures of Effectiveness - For each civilian manning alternative, the impact on cost and readiness shall be analyzed.

c. Constraints

(1) Planned force levels through 1983 shall be considered in developing numbers and types of ships identified for utilizing civilian manning.

(2) The analysis shall observe the guidance of enclosure (1) for the treatment of assumptions, threat, key parameters and qualitative measures and for the documentation of the methodology used.

d. Approach - The following analyses shall be accomplished:

(1) Prepare cost and personnel analyses for each type and class of Navy fleet support ship with military manning.

(2) Identify the skills which Civil Service marine and commercial union personnel are capable of performing in manning Navy fleet support ships. Prepare cost, personnel and readiness analyses for both levels of civilian manning to compare with military manning.

(3) Analyze mixed civilian and military manning where cost or readiness improvements are indicated.

(4) Compare the increased civilian manning alternatives with current fleet support policies, identifying changes which might permit lower cost operations.

(5) Evaluate the capabilities for mission accomplishment and feasibility of various options. Identify and measure the risks associated with each alternative.

6. Coordination and Review

a. The sponsor for this study is the Deputy Chief of Naval Operations for Logistics (OP-04).

b. The Project Officer will be Mr. I. N. Blickstein from the Systems Analysis Division, Support Forces, Manpower and Logistics Branch (OP-964).

c. The Advisory Committee, chaired by OP-04, will be composed of OP-90, OP-01, OP-02, OP-03, OP-40, OP-06 and OP-96. The Director, OPA, and representatives of MSC, NAVSEA and the President, CNA, are invited to participate as committee members. Advisory Committee members are requested to forward to the Project Officer, within two weeks, their nominations for Study Working Group members.

d. The study group will consist of contractor personnel and a working group as illustrated in enclosure (2).

e. The Director, Systems Analysis Division (OP-96) shall conduct a technical review to monitor progress and ensure quality of the study. During the course of the study, this effort shall review the working papers and reports for validity and completeness and shall provide an independent technical evaluation of the final report. Results from the review shall be promulgated to the Advisory Committee and the CNO Project Officer by OP-96.

7. Reporting

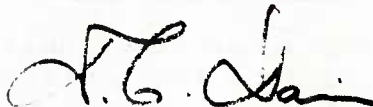
a. The study plan is to be submitted to the Advisory Committee no later than 31 January 1977.

b. The Project Officer shall submit monthly progress reports to OP-96 in accordance with current instructions.

c. Meetings of the Advisory Committee shall be called by the Chairman at appropriate times to provide guidance to the study group and to review and evaluate study progress and trends in accordance with reference (a). The committee shall meet at least once each month.

Ser 96/589421

d. The draft report is to be submitted to the Advisory Committee by 15 April 1977.



R. G. DAVIS

Director, OPA

Distribution List:

Director, OPA

OP-01

OP-02

OP-03

OP-04

OP-06

OP-40

OP-90

OP-96

MSC

President, CNA

NAVSEASYS COM

Copy to:

OP-05

OP-961

OP-962

OP-964

OP-966

OP-96D

Fleet Commanders in Chief

Fleet Commanders

Type Commanders

CHNAVMAT

NPGS

## GUIDANCE FOR CNO STUDIES AND ANALYSES

1. The assumptions which are of great importance to the outcome of the analysis shall be clearly stated in the introduction to the report. Also, at the beginning of each chapter, annex or appendix, the complete set of assumptions which are applicable shall be listed. The analysis shall determine the effects of alternative assumptions when these are critical to the study results.

2. The analysis shall identify the threat which is approved by the current DIPP, relate this to current National Intelligence Estimates, and, if needed by the study, extrapolate from these approved data to project the threat into the years beyond the published DIPP. The analysis shall examine variations in the threat, over the range of reasonable uncertainty, to measure the sensitivity of the study results to the definition of the threat; however, any departure from the approved intelligence estimates shall be clearly identified and explained in the report to distinguish between that part of the analysis which is based on the approved threat and that which rests on a variation in the approved threat. The Project Officer will establish liaison with NISC OOW to obtain required threat documentation or for assistance necessary to prepare a request for specific Intelligence Production Requirements (DD Form 1497): OPNAVINST 3811.1 applies.

3. The analysis shall identify the key parameters (weapons systems effectiveness values, enemy tactics) which greatly affect the study results. Best estimates shall be used for the values of these parameters; in addition, greater and lesser values spanning the range of reasonable values for each parameter shall be used to determine the sensitivity of the study results to changes in these key parameters.

4. The analysis shall reflect the importance of qualitative factors such as the flexibility of systems or forces for multi-mission roles and the ease with which these forces may be inserted into or withdrawn from a confrontation.

5. A clear and concise description of each model or simulation shall be included in an appendix to the report unless such description is available in an already published document and is referenced in the report. This description shall explain in qualitative terms (including a logic diagram) the general methodology which provides the basis for the model. Detailed design specifications for each model, or reference to a permanent OPNAV file in which these design specifications are held, shall be included in the permanent files of this study.

WORKING GROUP MANNING REQUIREMENTS FOR THE STUDY ON  
INCREASED USE OF CIVILIAN MANNING ON FLEET SUPPORT SHIPS

1. Personnel assigned to the working group should have knowledge of fleet support ship mission, operations and maintenance. Each representative will be responsible for keeping his parent office, command or agency informed of the progress of the study and making the view of his parent office, command or agency known to the Study Project Officer. They will be under the direction of the Project Officer and will provide guidance and information to the study contractor.

2. The working group shall include at least one member from each of the following offices:

OP-01  
OP-02  
OP-03  
OP-04  
OP-90

In addition, the President, CNA; Commander MSC and Commander NAVSEA are requested to nominate members to the working group. Members will be required to spend less than ten percent of their time on the working group.





DEPARTMENT OF THE NAVY  
OFFICE OF THE CHIEF OF NAVAL OPERATIONS  
WASHINGTON, D.C. 20350

IN REPLY REFER TO

Ser 96/90545  
20 Apr 1977

MEMORANDUM FOR THE VICE CHIEF OF NAVAL OPERATIONS  
DIRECTOR, NAVY PROGRAM PLANNING

Subj: Increased Use of Civilian Manning of Fleet Support  
Ships Study Plan

Ref: (a) OPNAVINST 5000.30C

Encl: (1) Study Plan for the Increased Use of Civilian  
Manning of Fleet Support Ships Study

1. Enclosure (1) was approved by the Advisory Committee in  
accordance with the provisions of the reference (a), and is  
forwarded for information and retention.

*E. W. Cooke*

E. W. COOKE  
Deputy Chief of Naval  
Operations (Logistics)

Copy to:  
Director, OPA

OP-01

OP-02

OP-03

OP-40

OP-06

OP-90

OP-96

OP-964

OP-966

COMNAVSEASYS COM (SEA-94)

COMSC (MSC-M-311)

MARAD (Mr. Stryker)



Study Plan for Increased Use of Civilian Manning of Fleet Support Ships

Ref: (a) CNO Study Directive Ser. 96/589421 of 21 January 1977.

Encl: (1) Milestone Chart.  
(2) Representative Type/Class Ships to be Studied.

1. Tasks

a. Task 1

Collect from the Navy those data shown in Figure 1.

b. Task 2

Analyze current Navy military manning level requirements and reformat Ships Manning Documents (SMDs) by function.

c. Task 3

Analyze mission statements and identify and list those functions essential to successful mission accomplishment.

d. Task 4

Meet with MSC and MARAD and collect those data shown in Figure 1.

e. Task 5

1) Sub-task 5a

Determine which mission-essential functions can be accomplished by civilian manned support ships.\*

2) Sub-task 5b

Determine which mission-essential functions can be accomplished by civilian crews after training

---

\*Throughout this Study Plan the term "civilian manned" refers to support ship crewing with Navy Civil Service personnel or commercial contract crews recruited from the private maritime industry.

INFORMATION REQUIRED		SOURCE					
		CNO	SEASYSOM	BUPERS	FLTGINCS	MSC	MARAD
1	Mission & Characteristics of U.S. Navy ships. . .NWIP 11-20	X					
2	U.S. Navy Fleet Support Ship configurations; current & planned	X	X				
3	Ship operating costs; Fleet Support for MSC & Navy	X				X	
4	Ship Conversion Costs; Fleet Support	X	X			X	
5	Support Ship Procurement (Navy SCN)	X					
6	Fleet Support Ship Manning Documents a) Navy b) MSC	X					
						X	
7	Manpower Demography a) Navy b) Civilian			X			
							X
8	MSC Shipboard Manning Practices					X	
9	Navy/MSC Operating Personnel Cost Data Models	X				X	
10	Shipboard Security	X				X	
11	Shipboard Communication Support	X				X	
12	Fleet Support Ship Operating Schedules, Current & Planned	X			X		
13	U.S. Maritime Labor Policies & Practices					X	X
14	MSC Ship Chartering Policies and Practices					X	

Figure 1

RESPONSIBILITIES MATRIX

is provided.

3) Sub-task 5c

Determine which mission-essential functions may be accomplished by augmenting a civilian manned support ship with a Naval detachment.

4) Sub-task 5d

List the mission-essential functions which cannot be accomplished by a civilian manned support ship after training and Naval detachment augmentation is provided.

f. Task 6

Determine what changes in configuration are required to bring both currently operational and planned fleet support ships up to civilian habitability standards.

g. Task 7

1) Sub-task 7a

Determine the civilian manning levels required to accomplish those support functions which require no training or augmentation.

2) Sub-task 7b

Determine the civilian manning levels required to accomplish those support functions which require additional training but no augmentation.

3) Sub-task 7c

Determine the size and structure of the Navy detachment required to augment a civilian crew, if any.

h. Task 8

Combine findings from Task 7 and develop SMDs for civilian manning of support ships.

i. Task 9

Conduct a training requirements analysis for civilian crews.

j. Task 10

Analyze and determine the economic and budget costs of Navy military crews.

k. Task 11

Analyze and determine the economic and budget costs of training civilian crews.

l. Task 12

Analyze the economic and budget costs of augmentating civilian manned support ships with a Naval detachment.

m. Task 13

Analyze and determine the cost of reconfiguring operational and planned hulls to civilian habitability standards.

n. Task 14

Analyze and determine the economic and budget costs of civilian manning to include training, augmentation, and ship reconfiguration costs.

o. Task 15

Compare Navy military and civilian manning levels developed based on the foregoing analyses (Task 2 and 7).

p. Task 16

Compare the costs (economic and budget) of manning support ships with a Navy military crew with those exhibited by civilian crews.

q. Task 17

Conduct a comparative analysis of support ship readiness between Navy military manned and civilian manned support ships, and develop a Readiness Impact Statement based on the findings.



r. Task 18

Conduct a long-term cost analysis and prepare a detailed Cost Impact Statement outlining the benefits (both positive and negative) to be derived from increased levels of civilian manning.

s. Task 19

Conduct the required analyses and develop a Personnel Impact Statement outlining the Navy military personnel savings and/or additional requirements which will result from increased levels of civilian manning.

t. Task 20

Conduct an analysis of the mission fulfillment capabilities of fleet support ships when manned by civilian crews. This analysis will be conducted relative to the capabilities currently exhibited by Navy military manned support ships. In conjunction with this analysis, a Risk Analysis Statement will be prepared outlining the risks of civilian manning relative to the inability to completely carry out all assigned missions.

u. Task 21

Prepare a synthesis of the cost, manpower, readiness, capabilities, and risk analysis which will: 1) manifest the significance of increased civilian manning of fleet support ships by type/class vis-a-vis continued manning by Navy military personnel, and 2) assess the overall effect upon current U.S. Fleet mobile support policies, procedures, and practices if increased civilian manning alternatives are implemented.

v. Task 22

Prepare and present a draft final report to Advisory Committee for review and comment.

w. Task 23

Submit a final report of the study, responsive to comments received.

## 2. Scope and Depth

a. The scope of this study will address civilian manning on existing and planned U.S. Navy fleet support ships under the management and operational control of the Department of Defense through its contracting agent, the Military Sealift Command, in comparison to current Navy military manning.

b. Civilian shipboard manning resources under examination will include both Navy Civil Service manning and commercial contract manning from the commercial shipping industry. In keeping with current labor practices, Navy Civil Service mariners are to be employed directly by MSC for fleet support ship manning. Conversely, fleet support ships that are possible candidates for commercial contract manning will be bareboat chartered to private shipping companies for manning, operation, maintenance and services.

c. For each civilian manning option, the study will compile and analyze data to determine cost and mission effectiveness for each type and class of ship that is a potential candidate for civilian manning. An assessment of changes in military capabilities will be undertaken as the result of the shift from Navy military to civilian manning.

d. All cost analyses results will be given in accordance with POM-79-15 (Ser 902/8200, dated 6 Jan 1977).

e. Factors that point to a potential civilian seafarer manpower shortage in the out-years will be identified and their impact upon the continued use of civilian seafarers in fleet support ships evaluated.

f. This study will stress peacetime operations insofar as cost effectiveness is concerned.

## 3. Manpower Allocation

The military and contractor support as indicated in the Study Directive will be utilized fully for the completion of each task. Those personnel assigned from OPNAV and other Naval Commands and Support Activities will be utilized to collect data and assist in data analysis within their assigned functional areas of expertise. Contractor support personnel will perform analyses of Navy and other data inputs, and prepare documentation to support the study tasks and objectives.

#### 4. Funding Allocation

An estimate of \$44,000 is the funding required to obtain contractor assistance to perform analyses for Task 1 through Task 23.

#### 5. Other Resources

None.

#### 6. Task Schedule

Enclosure 1 is a Milestone Chart which depicts the time phasing of each task to be performed.

#### 7. Specific Guidance

a. The Study Group will investigate the feasibility of nominating representative classes of Naval fleet support ships for increased civilian manning. All shipboard functions are to be examined for feasibility for civilian manning except for Repair Departments. If, for reasons of security or specialization peculiar to Naval resources management, retention of Navy detachments in civilian manned ships is most practical it will be taken under advisement. The representative ships are shown in Enclosure 2.

b. All civilian manning alternatives that suggest the employment of commercial contract manning or the contractual employment of civilian manned Naval fleet support ships, shall be guided by the provisions of Department of Defense Directive 5160.10, dated 3 March 1967, "Single Manager Assignment for Ocean Transportation," with changes thereto.

c. Data collection that normally relates to the employment of private shipping personnel and resources shall be obtained from government sources, i.e., Military Sealift Command, Maritime Administration. Should contributions to the study from non-government maritime activities be desired or necessary, authorization to contact such activities must be obtained from CNO (OP-96) on a case basis.

d. Total program costs will be computed as a cost to the U.S. Government with U.S. Navy costs readily identifiable therein.

## 8. Methodology

a. Initially, the study effort will focus on a ship-board functional analysis, using the current U.S. Navy Ship Manning Document for each type and class of naval fleet support ship, to identify the skills that can be provided by civilians. In those billets where training can upgrade the skill and capabilities of civilians to Navy standards, training methods and training costs will be determined. Should it be determined that security measures or specializations unique to Navy resources management preclude assignment of civilians to fill such billets, Navy augmentation detachments will be structured and costed out as part of the total program manpower costs.

b. As civilian fleet support ship manpower requirements are identified, ship reconfiguration costs will be generated for each type/class of ship which civilian mariners are capable of manning.

c. Based upon the foregoing analysis, the economic efficacy of civilian manning will be determined. Reports showing the cost differential between Navy military manning and both types of civilian manning alternatives will be prepared.

d. Concurrently, a comparative analysis between the current Navy support ship readiness levels using Navy crews, and the level of readiness already experienced with the Navy Civil Service manning of selected fleet support ships in an earlier program will be conducted. Wherever readiness measures can be quantified, grades will be assigned.

e. The impact of cost and manpower savings will be assessed for its effect upon budget planning factors.

f. A Mission Fulfillment Capability Analysis will be prepared for each civilian manning alternative, within each operational scenario, and for each type/class of ship studied.

## 9. Effectiveness Criteria

For each manning alternative, the impact on cost and readiness shall be analyzed.

#### 10. Reports

A draft report of all study findings will be prepared for review 15 days before the scheduled study termination date. In addition, materials such as charts, viewgraphs, slides, etc., will be prepared which summarize the data and findings of the project. These materials will be suitable for use in briefings and presentations.

#### 11. Coordination

The Study Group will coordinate all research, data collection, etc., with the Office of Program Appraisal, Military Sealift Command, Maritime Administration, CNO offices and other Naval activities. The distribution of the final report will be determined at the final review by the Advisory Committee.



# MILESTONE CHART

TASKS	MONTHS				JAN				FEB				MAR				APR				MAY				JUN			
	WEEKS	1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
PRELIMINARY STUDY PLAN																												
STUDY PLAN																												
1 COLLECT DATA FROM NAVY																												
2 NAVY MILITARY MANNING ANALYSIS																												
3 FUNCTIONS ANALYSES																												
4 COLLECT DATA FROM MSC, MARAD																												
5a CIVILIAN CAPABILITIES ANALYSES																												
5b CIVILIAN CAPABILITIES ANALYSES (TRNG)																												
5c CIVILIAN CAPABILITIES ANALYSES (AUGMENTATION)																												
5d LIST REMAINING FUNCTIONS																												
6 CONFIGURATION ANALYSES																												
7a CIVILIAN MANNING ANALYSES																												
7b CIVILIAN MANNING ANALYSES (TRNG)																												

Project Task

MSC  
MARAD

# MILESTONE CHART

MONTHS		DEC		JAN		FEB		MAR		APR		MAY		JUN													
TASKS	WEEKS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
7c CIVILIAN MANNING ANALYSES AUGMENTATION																											
8 CIVILIAN MANNING SMDs																											
9 TRAINING REQUIREMENTS ANALYSES																											
10 COST ANALYSES NAVY MILITARY CREWS																											
11 COST ANALYSES CIVILIAN TRAINING																											
12 COST ANALYSES CIVILIAN CREW AUGMENTATION																											
13 SHIP RECONFIGURATION																											
14 COST ANALYSES CIVILIAN CREWS																											
15 MANNING LEVEL COMPARISONS																											
16 MANNING COSTS COMPARISONS																											
17 READINESS IMPACT STATEMENT																											
18 COST IMPACT STATEMENT																											
19 PERSONNEL IMPACT STATEMENT																											

[illegible]

# TASK SCHEDULE

See Note Below	TASK	DATA SOURCE	DATE
	Preliminary Study Plan		15 Dec - 31 Dec
	Study Plan		1 Jan - 15 Jan
1	Collect Data From Navy		1 Jan - 15 Mar
2	Navy Military Manning Analysis		15 Jan - 17 Mar
3	Functions Analysis		10 Jan - 18 Mar
4	Collect Data	MSC	10 Jan - 22 Mar
		MARAD	4 Feb - 3 May
5a	Civilian Capabilities Analyses	MSC	22 Mar - 8 Apr
		MARAD	28 Mar - 6 May
5b	Civilian Capabilities Analyses Training	MSC	28 Mar - 12 Apr
		MARAD	28 Mar - 13 May
5c	Civilian Capabilities Analyses Augmentation	MSC	28 Mar - 12 Apr
		MARAD	28 Mar - 13 May
5d	List Remaining Functions	MSC	1 Apr - 15 Apr
		MARAD	1 Apr - 17 May
6	Configuration Analysis	MSC	22 Mar - 15 Apr
		MARAD	28 Mar - 17 May
7a	Civilian Manning Analyses	MSC	1 Apr - 22 Apr
		MARAD	1 Apr - 20 May
7b	Civilian Manning Analyses Training	MSC	1 Apr - 22 Apr
		MARAD	1 Apr - 20 May
7c	Civilian Manning Analyses Augmentation	MSC	1 Apr - 29 Apr
		MARAD	1 Apr - 20 May
8	Civilian Manning SMDs	MSC	1 Apr - 29 Apr
		MARAD	1 Apr - 25 May
9	Training Requirements Analyses	MSC	1 Apr - 29 Apr
		MARAD	1 Apr - 25 May
10	Cost Analyses Navy Military Crews		20 Feb - 21 Mar
11	Cost Analyses Civilian Training	MSC	22 Mar - 29 Apr
		MARAD	1 Apr - 25 May
12	Cost Analyses Civilian Crew Augmentation	MSC	22 Mar - 29 Apr
		MARAD	1 Apr - 25 May
13	Cost Analysis Ship Reconfiguration	MSC	22 Mar - 29 Apr
		MARAD	1 Apr - 25 May

Note: The numbers in this column are the numbers of each task and sub-task as shown in pages 1 thru 4 of this study plan.

# TASK SCHEDULE (CONTINUED)

<u>TASK</u>		<u>DATE</u>
14	Cost Analysis Civilian Crews	MSC 1 Apr - 6 May
		MARAD 1 Apr - 31 May
15	Manning Level Comparisons	MSC 22 Mar - 6 May
		MARAD 1 Apr - 31 May
16	Manning Cost Comparisons	MSC 1 Apr - 13 May
		MARAD 1 Apr - 31 May
17	Readiness Impact Statement	22 Mar - 3 Jun
18	Cost Impact Statement	1 Apr - 3 Jun
19	Personnel Impact Statement	1 Apr - 3 Jun
20	Mission Fulfillment Capabilities Analyses	11 Apr - 10 Jun
21	Synthesis of Manning Parameters	11 Apr - 10 Jun
22	Draft Final Report	18 Apr - 15 Jun
23	Final Report	22 Jun - 30 Jun

REPRESENTATIVE TYPE/CLASS SHIPS  
TO BE STUDIED

Underway Replenishment

AF-57 <sup>3</sup>	AFS-3
AOR-4	AOE-4
AE-28	AO-177

Maintenance Support Ships

AD-37	AS-36
AR-6	

Minor Fleet Support Ships

ARS-41	ASR-22
ATF-162	ATS-1





## APPENDIX A

### MANPOWER REQUIREMENTS AND COST ANALYSIS

#### A. MANPOWER REQUIREMENTS ANALYSIS

1. This appendix describes and compares the organizational manpower requirements to operate the support fleet ships under both military and civilian options. The basis for this comparison is the Navy military organizational manning called for in the SMD Condition III (three section watch at sea).

2. The various SMDs document the rationale for manning the specific ship classes based upon ship configuration, computed workload, required operational capabilities and operating profile. The level of manning so documented for each class of fleet support ship is a statement of the Navy's minimum quantitative and qualitative manpower needs.

3. In order to compare Navy military manning to Navy Civil Service and Commercial Contract manning it is necessary to reformat Navy military manning to make it possible to compare the manning documents. This has been done by restructuring the Navy shipboard departmental organization structure to relate to the civilian shipboard organizational format by Deck, Engine, Steward, Purser, Medical, Communications, and Repair Departments. A cross-reference between respective departments is shown below in Table A-1.

TABLE A-1

Civilian/Navy Shipboard Organization Cross Reference

<u>CIVILIAN</u>	<u>NAVY</u>
Deck	Executive Navigation Operations (less Communications) Deck
Steward	Supply (Services)
Purser	Supply (Support)
Medical	Medical
Communications	Communications
Engine Repair	Engineering Repair

4. The total Navy military manpower requirements for the thirteen representative ships selected for study are shown by department in Tables A-3 through A-15 of this appendix. These requirements have been summarized by ship type and are shown in Table A-2.

5. The manpower requirements estimates for Navy Civil Service manning of the fleet support ships were obtained from the Military Sealift Command (MSC). MSC's estimates of manning requirements are based on their functional analysis of the tasks required to ensure peacetime mission performance and ship maintenance.

6. The estimates include both the Civil Service personnel and the military detachments required for ship operation.

7. The civil service manpower requirements for manning

TABLE A-2  
MANPOWER REQUIREMENTS COMPARISON--  
SUPPORT FLEET MANNING ALTERNATIVES

SHIP TYPE	NAVY MILITARY MANNING	NAVY CIVIL SERVICE MANNING		COMMERCIAL CONTRACT MANNING	
		CIVIL SERVICE	MILITARY DETACHMENT	CONTRACT PERSONNEL	TOTAL
AF	250	113	18	96	123
AFS	447	125	45 <sup>1/</sup>	148	203 <sup>2/</sup>
AOR	418	115	29	144	176
AOE	568	159	40	175	224
AE	382	121	27	117	158
AO	183	89	19	84	103
AD	1,175	147	706	118	824
AS	1,145	147	784	118	902
AR	693	147	364	130	494
ARS	104	28	6	24	32
ASR	209	59	29	44	72
ATF	47	16	4	25	35
ATS	134	28	14	25	40

<sup>1/</sup>This is the number of personnel in the Military Detachment during the first operating year only for purposes of training commercial contract personnel in ship logistic cargo management. In all subsequent years the Military Detachment consists of 30 personnel, and total personnel equals 155.

<sup>2/</sup>This is the number of personnel in the Military Detachment during the first year of operation. In all subsequent years the Military Detachment consists of 39 personnel, and total personnel equals 187

NOTE: Navy Civil Service and Commercial Contract Manning provides fewer manned UNREP stations than Navy Military Manning. Also neither Combat Information Center nor Weapons are manned.

TABLE A-3

## MANPOWER REQUIREMENTS SUMMARY

(NAVY MILITARY MANNING)

TYPE SHIP: Stores

REPRESENTATIVE SHIP STUDIED: AF-58

NUMBER OF SHIPS IN FLEET 1

DIVISION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	ALL GRADES
DECK	6	0	109	115	6	0	109	115
ENGINE	2	2	76	80	2	2	76	80
STEWARD	0	0	0	0	0	0	0	0
PURSER	2	1	43	46	2	1	43	46
MEDICAL	0	0	0	0	0	0	0	0
COMMUNICA-TIONS	1	0	8	9	1	0	8	9
REPAIR	0	0	0	0	0	0	0	0
ALL DIVISIONS	11	3	236	250	11	3	236	250



TABLE A-4

## MANPOWER REQUIREMENTS SUMMARY

(NAVY MILITARY MANNING)

TYPE SHIP: Combat StoresREPRESENTATIVE SHIP STUDIED: AFS-3

NUMBER OF SHIPS IN FLEET

7

DIVISION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	ALL GRADES
DECK	9	1	172	182	63	7	1204	1274
ENGINE	3	2	114	119	21	14	798	833
STEWARD	0	1	40	41	0	7	280	287
PURSER	6	0	71	77	42	0	497	539
MEDICAL	1	0	5	6	7	0	35	42
COMMUNICATIONS	1	0	21	22	7	0	147	154
REPAIR	0	0	0	0	0	0	0	0
ALL DIVISIONS	20	4	423	447	140	28	2961	3129



TABLE A-5

## MANPOWER REQUIREMENTS SUMMARY

(NAVY MILITARY MANNING)

TYPE SHIP: Replenishment OilerREPRESENTATIVE SHIP STUDIED: AOR-4NUMBER OF SHIPS IN FLEET 7

DIVISION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	ALL GRADES
DECK	8	1	175	184	56	7	1225	1288
ENGINE	4	1	124	129	28	7	868	903
STEWARD	0	0	33	33	0	0	231	231
PURSER	3	0	42	45	21	0	294	315
MEDICAL	1	0	4	5	7	0	28	35
COMMUNICA-TIONS	1	0	21	22	7	0	147	154
REPAIR	0	0	0	0	0	0	0	0
ALL DIVISIONS	17	2	399	418	119	14	2793	2926

TABLE A-6

## MANPOWER REQUIREMENTS SUMMARY

(NAVY MILITARY MANNING)

TYPE SHIP: Fast Combat Support

REPRESENTATIVE SHIP STUDIED: AOE-3

NUMBER OF SHIPS IN FLEET

4

DIVISION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	ALL GRADES
DECK	9	2	243	254	36	8	972	1016
ENGINE	2	3	183	188	8	12	732	752
STEWARD	1	0	48	49	4	0	192	196
PURSER	3	1	45	49	12	4	180	196
NEDICAL	1	0	5	6	4	0	20	24
COMMUNICA-TIONS	1	0	21	22	4	0	84	88
REPAIR	0	0	0	0	0	0	0	0
ALL DIVISIONS	17	6	545	568	68	24	2180	2272

TABLE A-7

MANPOWER REQUIREMENTS SUMMARY  
(NAVY MILITARY MANNING)

DIVISION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	ALL GRADES
DECK	6	3	195	204	78	39	2535	2652
ENGINE	2	2	98	102	26	26	1274	1326
STEWARD	0	0	28	28	0	0	364	364
PURSER	2	0	21	23	26	0	273	299
MEDICAL	1	0	3	4	13	0	39	52
COMMUNICATIONS	1	0	20	21	13	0	260	273
REPAIR	0	0	0	0	0	0	0	0
ALL DIVISIONS	12	5	365	382	156	65	4745	4966

TYPE SHIP: AmmunitionREPRESENTATIVE SHIP STUDIED: AE-28NUMBER OF SHIPS IN FLEET 13



TABLE A-8

## MANPOWER REQUIREMENTS SUMMARY

(NAVY MILITARY MANNING)

TYPE SHIP: Fleet Oiler

REPRESENTATIVE SHIP STUDIED: AO-177

NUMBER OF SHIPS IN FLEET

16

DIVISION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	ALL GRADES
DECK	5	1	70	76	80	16	1120	1216
ENGINE	2	1	62	65	32	16	992	1040
STEWARD	0	0	17	17	0	0	272	272
PURSER	1	0	11	12	16	0	176	192
MEDICAL	0	0	0	0	0	0	0	0
COMMUNICA-TIONS	1	0	12	13	16	0	192	208
REPAIR	0	0	0	0	0	0	0	0
ALL DIVISIONS	9	2	172	183	144	32	2752	2928

TABLE A-9

## MANPOWER REQUIREMENTS SUMMARY

(NAVY MILITARY MANNING)

TYPE SHIP: Destroyer TenderREPRESENTATIVE SHIP STUDIED: AD-37NUMBER OF SHIPS IN FLEET 9

DIVISION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	ALL GRADES
DECK	5	2	177	184	45	18	1593	1656
ENGINE	1	2	181	184	9	18	1629	1656
STEWARD	1	0	100	101	9	0	900	909
PURSER	5	1	110	116	45	9	990	1044
MEDICAL	6	0	22	28	54	0	198	252
COMMUNICA- TIONS	1	0	26	27	9	0	234	243
REPAIR	2	7	526	535	18	63	4734	4815
ALL DIVISIONS	21	12	1142	1175	189	108	10278	10575

TABLE A-10

## MANPOWER REQUIREMENTS SUMMARY

(NAVY MILITARY MANNING)

TYPE SHIP: Submarine TenderREPRESENTATIVE SHIP STUDIED: AS-36

NUMBER OF SHIPS IN FLEET

12

DIVISION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	ALL GRADES
DECK	6	2	135	143	72	24	1620	1716
ENGINE	2	2	169	173	24	24	2028	2076
STEWARD	0	1	44	45	0	12	528	540
PURSER	7	1	53	61	84	12	636	732
MEDICAL	6	0	22	28	72	0	264	336
COMMUNICATIONS	1	0	26	27	12	0	312	324
REPAIR	8	7	653	668	96	84	7836	8016
ALL DIVISIONS	30	13	1102	1145	360	156	13224	13740



TABLE A-11

## MANPOWER REQUIREMENTS SUMMARY

(NAVY MILITARY MANNING)

TYPE SHIP: Heavy Repair ShipREPRESENTATIVE SHIP STUDIED: AR-6

NUMBER OF SHIPS IN FLEET

4

DIVISION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	ALL GRADES
DECK	6	0	117	123	24	0	468	492
ENGINE	2	1	131	134	8	4	524	536
STEWARD	0	1	71	72	0	4	284	288
PURSER	4	0	70	74	16	0	280	296
MEDICAL	3	1	14	18	12	4	56	72
COMMUNICA-TIONS	1	0	27	28	4	0	108	112
REPAIR	2	5	237	244	8	20	948	976
ALL DIVISIONS	18	8	667	693	72	32	2668	2772

TABLE A-12

## MANPOWER REQUIREMENTS SUMMARY

(NAVY MILITARY MANNING)

TYPE SHIP: Salvage ShipREPRESENTATIVE SHIP STUDIED: ARS-41

NUMBER OF SHIPS IN FLEET

6

DIVISION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	ALL GRADES
DECK	4	1	48	53	24	6	288	318
ENGINE	0	1	40	41	0	6	240	246
STEWARD	0	0	0	0	0	0	0	0
PURSER	0	0	10	10	0	0	60	60
MEDICAL	0	0	0	0	0	0	0	0
COMMUNICA-TIONS	0	0	0	0	0	0	0	0
REPAIR	0	0	0	0	0	0	0	0
ALL DIVISIONS	4	2	98	104	24	12	588	624

TABLE A-13

## MANPOWER REQUIREMENTS SUMMARY

(NAVY MILITARY MANNING)

TYPE SHIP: Salvage & RescueREPRESENTATIVE SHIP STUDIED: ASR-22NUMBER OF SHIPS IN FLEET 6

DIVISION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	ALL GRADES
DECK	5	1	101	107	30	6	606	642
ENGINE	1	1	60	62	6	6	360	372
STEWARD	0	0	19	19	0	0	114	114
PURSER	1	0	8	9	6	0	48	54
MEDICAL	0	0	0	0	0	0	0	0
COMMUNICA-TIONS	0	0	12	12	0	0	72	72
REPAIR	0	0	0	0	0	0	0	0
ALL DIVISIONS	7	2	200	209	42	12	1200	1254



TABLE A-14

## MANPOWER REQUIREMENTS SUMMARY

(NAVY MILITARY MANNING)

TYPE SHIP: TOWINGREPRESENTATIVE SHIP STUDIED: ATF-166NUMBER OF SHIPS IN FLEET 7

DIVISION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	ALL GRADES
DECK	2	1	11	14	14	7	77	98
ENGINE	0	1	16	17	0	7	112	119
STEWARD	0	0	0	0	0	0	0	0
PURSER	0	0	6	6	0	0	42	42
MEDICAL	0	0	0	0	0	0	0	0
COMMUNICA-TIONS	0	0	10	10	0	0	70	70
REPAIR	0	0	0	0	0	0	0	0
ALL DIVISIONS	2	2	43	47	14	14	301	329

TABLE A-15

## MANPOWER REQUIREMENTS SUMMARY

(NAVY MILITARY MANNING)

TYPE SHIP: Towing & SalvageREPRESENTATIVE SHIP STUDIED: ATS-1

NUMBER OF SHIPS IN FLEET

3

DIVISION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	ALL GRADES
DECK	5	0	54	59	15	0	162	177
ENGINE	0	1	54	55	0	3	162	165
STEWARD	0	0	0	0	0	0	0	0
PURSER	1	0	19	20	3	0	57	60
MEDICAL	0	0	0	0	0	0	0	0
COMMUNICA-TIONS	0	0	0	0	0	0	0	0
REPAIR	0	0	0	0	0	0	0	0
ALL DIVISIONS	6	1	127	134	18	3	381	402

the thirteen representative ships are shown by department in Tables A-16 through A-28.

8. MSC has included within its manpower requirements estimates of necessary Navy military detachments for each of the thirteen representative ships. These military detachments will carry out mission essential functions which are either considered to be inappropriate for accomplishment by Civil Service personnel, or which cost substantially less when accomplished by military personnel. Navy military detachment manpower requirements as proposed by MSC are shown by function accomplished in Tables A-29 through A-41.

9. The manpower requirements estimates for commercial contract manning of the ships under study were obtained from the U.S. Maritime Administration (MARAD). These estimates are based on MARAD's functional analysis of the tasks required to accomplish assigned peacetime missions and to perform ship maintenance.

10. The manpower requirements for commercial contract personnel provided by MARAD are shown by department in Tables A-42 through A-54 of this Appendix.

11. For the Commercial Contract manning case, the size and structure of required Navy military detachments was developed by the Study Team. These detachments are designed to specifically fill functions not manned by commercial contract personnel. The military detachments developed are shown in Table A-55 through A-67 of this



TABLE A-16

MANPOWER REQUIREMENTS SUMMARY  
(NAVY CIVIL SERVICE PERSONNEL)TYPE SHIP STORESREPRESENTATIVE SHIP STUDIED AF-58NUMBER OF SHIPS IN FLEET 1

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	6	46	52	6	46	52
ENGINE	6	29	35	6	29	35
STEWARD	0	23	23	0	23	23
PURSER	0	2	2	0	2	2
MEDICAL	0	1	1	0	1	1
ALL	12	101	113	12	101	113

TABLE A-17

MANPOWER REQUIREMENTS SUMMARY  
(NAVY CIVIL SERVICE PERSONNEL)TYPE SHIP COMBAT STORESREPRESENTATIVE SHIP STUDIED AFS-3NUMBER OF SHIPS IN FLEET 7

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	6	49	55	42	343	385
ENGINE	6	28	34	42	196	238
STEWARD	0	27	27	0	189	189
PURSER	0	8	8	0	56	56
MEDICAL	0	1	1	0	7	7
ALL	12	113	125	84	791	875

TABLE A-18

MANPOWER REQUIREMENTS SUMMARY  
(NAVY CIVIL SERVICE PERSONNEL)TYPE SHIP REPLENISHMENT OILERREPRESENTATIVE SHIP STUDIED AOR-4NUMBER OF SHIPS IN FLEET 7

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	6	42	48	42	294	336
ENGINE	10	26	36	70	182	252
STEWARD	0	24	24	0	168	168
PURSER	0	6	6	0	42	42
MEDICAL	0	1	1	0	7	7
ALL	16	99	115	112	693	805

TABLE A-19

MANPOWER REQUIREMENTS SUMMARY  
(NAVY CIVIL SERVICE PERSONNEL)TYPE SHIP FAST COMBAT SUPPORTREPRESENTATIVE SHIP STUDIED AOE-3NUMBER OF SHIPS IN FLEET 4

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	6	45	51	24	180	204
ENGINE	24	44	68	96	176	272
STEWARD	0	33	33	0	132	132
PURSER	0	6	6	0	24	24
MEDICAL	0	1	1	0	4	4
ALL	30	129	159	120	516	636

TABLE A-20

MANPOWER REQUIREMENTS SUMMARY  
(NAVY CIVIL SERVICE PERSONNEL)TYPE SHIP AMMUNITIONREPRESENTATIVE SHIP STUDIED AE-28 NUMBER OF SHIPS IN FLEET 13

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	6	49	55	78	637	715
ENGINE	6	28	34	78	364	442
STEWARD	0	29	29	0	377	377
PURSER	0	3	3	0	39	39
MEDICAL	0	0	0	0	0	0
ALL	12	109	121	156	1417	1573

TABLE A-21

MANPOWER REQUIREMENTS SUMMARY  
(NAVY CIVIL SERVICE PERSONNEL)TYPE SHIP FLEET OILERREPRESENTATIVE SHIP STUDIED AO-177NUMBER OF SHIPS IN FLEET 16

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	6	31	37	96	496	592
ENGINE	8	14	22	128	224	352
STEWARD	0	22	22	0	352	352
PURSER	0	7	7	0	112	112
MEDICAL	0	1	1	0	16	16
ALL	14	75	89	224	1200	1424



TABLE A-22

MANPOWER REQUIREMENTS SUMMARY  
(NAVY CIVIL SERVICE PERSONNEL)TYPE SHIP DESTROYER TENDERREPRESENTATIVE SHIP STUDIED AD-37

NUMBER OF SHIPS IN FLEET

9

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	5	21	26	45	189	234
ENGINE	7	19	26	63	171	234
STEWARD	0	93	93	0	837	837
PURSER	0	2	2	0	18	18
MEDICAL	0	0	0	0	0	0
ALL	12	135	147	108	1215	1323

TABLE A-23

MANPOWER REQUIREMENTS SUMMARY  
(NAVY CIVIL SERVICE PERSONNEL)

TYPE SHIP SUBMARINE TENDER      REPRESENTATIVE SHIP STUDIED AS-36      NUMBER OF SHIPS IN FLEET 12

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	6	20	26	72	240	312
ENGINE	7	19	26	84	228	312
STEWARD	0	93	93	0	1116	1116
PURSER	0	2	2	0	24	24
MEDICAL	0	0	0	0	0	0
ALL	13	134	147	156	1608	1764

TABLE A-24

MANPOWER REQUIREMENTS SUMMARY  
(NAVY CIVIL SERVICE PERSONNEL)TYPE SHIP HEAVY REPAIRREPRESENTATIVE SHIP STUDIED AR-6NUMBER OF SHIPS IN FLEET 4

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	6	20	26	24	80	104
ENGINE	7	19	26	28	76	104
STEWARD	0	93	93	0	372	372
PURSER	0	2	2	0	8	8
MEDICAL	0	0	0	0	0	0
ALL	13	134	147	52	536	588

TABLE A-25

MANPOWER REQUIREMENTS SUMMARY  
(NAVY CIVIL SERVICE PERSONNEL)TYPE SHIP SALVAGEREPRESENTATIVE SHIP STUDIED ARS-41NUMBER OF SHIPS IN FLEET 6

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	4	8	12	24	48	72
ENGINE	4	6	10	24	36	60
STEWARD	0	6	6	0	36	36
PURSER	0	0	0	0	0	0
MEDICAL	0	0	0	0	0	0
ALL	8	20	28	48	120	168

TABLE A-26

MANPOWER REQUIREMENTS SUMMARY  
(NAVY CIVIL SERVICE PERSONNEL)TYPE SHIP SALVAGE & RESCUEREPRESENTATIVE SHIP STUDIED ASR-22NUMBER OF SHIPS IN FLEET 6

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	5	15	20	30	90	120
ENGINE	8	15	23	48	90	138
STEWARD	0	14	14	0	84	84
PURSER	0	2	2	0	12	12
MEDICAL	0	0	0	0	0	0
ALL	13	46	59	78	276	354



TABLE A-27

MANPOWER REQUIREMENTS SUMMARY  
(NAVY CIVIL SERVICE PERSONNEL)TYPE SHIP TOWINGREPRESENTATIVE SHIP STUDIED ATF-166NUMBER OF SHIPS IN FLEET 7

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	3	6	9	21	42	63
ENGINE	1	2	3	7	14	21
STEWARD	0	4	4	0	28	28
PURSER	0	0	0	0	0	0
MEDICAL	0	0	0	0	0	0
ALL	4	12	16	28	84	112

TABLE A-28

MANPOWER REQUIREMENTS SUMMARY  
(NAVY CIVIL SERVICE PERSONNEL)TYPE SHIP TOWING & SALVAGEREPRESENTATIVE SHIP STUDIED ATS-1NUMBER OF SHIPS IN FLEET 3

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	4	8	12	12	24	36
ENGINE	4	6	10	12	18	30
STEWARD	0	6	6	0	18	18
PURSER	0	0	0	0	0	0
MEDICAL	0	0	0	0	0	0
ALL	8	20	28	24	60	84

TABLE A-29

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--NAVY CIVIL SERVICE MANNING)

TYPE SHIP STORESREPRESENTATIVE SHIP STUDIED AF-58NUMBER OF SHIPS IN FLEET 1

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS	1	0	1	2	1	0	1	2
ADMINISTRATION	0	0	1	1	0	0	1	1
COMMUNICATIONS	0	0	13	13	0	0	13	13
SUPPLY	0	0	2	2	0	0	2	2
MEDICAL/DENTAL								
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
ALL	1	0	17	18	1	0	17	18

TABLE A-30

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--NAVY CIVIL SERVICE MANNING)

TYPE SHIP COMBAT STORESREPRESENTATIVE SHIP STUDIED AFS-3 NUMBER OF SHIPS IN FLEET 7

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS	1	0	1	2	7	0	7	14
ADMINISTRATION	0	0	1	1	0	0	7	7
COMMUNICATIONS	3	0	24	24	0	0	168	168
SUPPLY *	0	0	15	15	0	0	105	105
MEDICAL/DENTAL								
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)	0	0	3	3	0	0	21	21
SALVAGE/RESCUE								
ALL	1	0	44	45	7	0	308	315

\* First year of operation only

TABLE A-31

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--NAVY CIVIL SERVICE MANNING)

TYPE SHIP REPLENISHMENT OILERREPRESENTATIVE SHIP STUDIED AOR-4NUMBER OF SHIPS IN FLEET 7

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS	1	0	1	2	7	0	7	14
ADMINISTRATION	0	0	1	1	0	0	7	7
COMMUNICATIONS	0	0	24	24	0	0	168	168
SUPPLY	0	0	2	2	0	0	14	14
MEDICAL/DENTAL								
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
ALL	1	0	28	29	7	0	196	203



TABLE A-32

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--NAVY CIVIL SERVICE MANNING)

TYPE SHIP FAST COMBAT SUPPORTREPRESENTATIVE SHIP STUDIED AOE-3NUMBER OF SHIPS IN FLEET 4

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS	1	0	1	2	4	0	4	8
ADMINISTRATION	0	0	1	1	0	0	4	4
COMMUNICATIONS	0	0	24	24	0	0	96	96
SUPPLY								
MEDICAL/DENTAL								
GUARD	1	1	7	9	4	4	28	36
(EXPLOSIVE ORD. DISPOSAL)	0	0	4	4	0	0	16	16
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
ALL	2	1	37	40	8	4	148	160

TABLE A-33

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--NAVY CIVIL SERVICE MANNING)

TYPE SHIP AMMUNITIONREPRESENTATIVE SHIP STUDIED AE-28NUMBER OF SHIPS IN FLEET 13

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS	1	0	0	1	13	0	0	13
ADMINISTRATION	0	0	2	2	0	0	26	26
COMMUNICATIONS	0	0	12	12	0	0	156	156
SUPPLY	0	0	1	1	0	0	13	13
MEDICAL/DENTAL	0	0	1	1	0	0	13	13
GUARD	1	1	6	8	13	13	78	104
(EXPLOSIVE ORD. DISPOSAL)	0	0	2	2	0	0	26	26
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
ALL	2	1	24	27	26	13	312	351

TABLE A-34

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--NAVY CIVIL SERVICE MANNING)

TYPE SHIP FLEET OILERREPRESENTATIVE SHIP STUDIED AO-177NUMBER OF SHIPS IN FLEET 16

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS	1	0	1	2	16	0	16	32
ADMINISTRATION	0	0	1	1	0	0	16	16
COMMUNICATIONS	0	0	16	16	0	0	256	256
SUPPLY								
MEDICAL/DENTAL								
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
ALL	1	0	18	19	16	0	288	304

TABLE A-35

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--NAVY CIVIL SERVICE MANNING)

TYPE SHIP DESTROYER TENDERREPRESENTATIVE SHIP STUDIED AD-37NUMBER OF SHIPS IN FLEET 9

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS								
ADMINISTRATION								
COMMUNICATIONS	1	0	26	27	9	0	234	243
SUPPLY	5	1	110	116	45	9	990	1044
MEDICAL/DENTAL	6	0	22	28	54	0	198	252
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
REPAIR	2	7	526	535	18	63	4734	4815
ALL	14	8	684	706	126	72	6156	6354

TABLE A-36

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--NAVY CIVIL SERVICE MANNING)

TYPE SHIP Submarine TenderREPRESENTATIVE SHIP STUDIED AS-36NUMBER OF SHIPS IN FLEET 12

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS								
ADMINISTRATION								
COMMUNICATIONS	1	0	26	27	12	0	312	324
SUPPLY	7	1	53	61	84	12	636	732
MEDICAL/DENTAL	6	0	22	28	72	0	264	336
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
REPAIR	8	7	653	668	96	84	7836	8016
ALL	22	8	754	784	264	96	9048	9408



TABLE A-37

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--NAVY CIVIL SERVICE MANNING)

TYPE SHIP HEAVY REPAIRREPRESENTATIVE SHIP STUDIED AR-6NUMBER OF SHIPS IN FLEET 4

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS								
ADMINISTRATION								
COMMUNICATIONS	1	0	27	28	4	0	108	112
SUPPLY	4	0	70	74	16	0	280	296
MEDICAL/DENTAL	3	1	14	18	12	4	56	72
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
REPAIR	2	5	237	244	8	20	948	976
ALL	10	6	348	364	40	24	1392	1456

TABLE A-38

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--NAVY CIVIL SERVICE MANNING)

TYPE SHIP SALVAGEREPRESENTATIVE SHIP STUDIED ARS-41NUMBER OF SHIPS IN FLEET 6

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS								
ADMINISTRATION								
COMMUNICATIONS	0	0	6	6	0	0	36	36
SUPPLY								
MEDICAL/DENTAL								
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
ALL	0	0	6	6	0	0	36	36

TABLE A-39

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--NAVY CIVIL SERVICE MANNING)

TYPE SHIP SALVAGE & RESCUEREPRESENTATIVE SHIP STUDIED ASR-22NUMBER OF SHIPS IN FLEET 6

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS	1	0	1	2	6	0	6	12
ADMINISTRATION	0	0	1	1	0	0	6	6
COMMUNICATIONS	0	0	14	14	0	0	84	84
SUPPLY								
MEDICAL/DENTAL	0	0	3	3	0	0	18	18
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE	1	0	8	9	6	0	48	54
ALL	2	0	27	29	12	0	162	174

TABLE A-40

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--NAVY CIVIL SERVICE MANNING)

TYPE SHIP TOWINGREPRESENTATIVE SHIP STUDIED ATF-166NUMBER OF SHIPS IN FLEET 7

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS								
ADMINISTRATION								
COMMUNICATIONS	0	0	4	4	0	0	28	28
SUPPLY								
MEDICAL/DENTAL								
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
ALL	0	0	4	4	0	0	28	28

TABLE A-41

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--NAVY CIVIL SERVICE MANNING)

TYPE SHIP TOWING AND SALVAGEREPRESENTATIVE SHIP STUDIED ATS-1NUMBER OF SHIPS IN FLEET 3

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS								
ADMINISTRATION								
COMMUNICATIONS	0	0	6	6	0	0	18	18
SUPPLY								
MEDICAL/DENTAL								
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE	1	0	7	8	3	0	21	24
REPAIR								
ALL	1	0	13	14	3	0	39	42



TABLE A-42

MANPOWER REQUIREMENTS SUMMARY  
(UNION PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP STORESREPRESENTATIVE SHIP STUDIED AF-58NUMBER OF SHIPS IN FLEET 1

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	6	37	43	6	37	43
ENGINE	8	22	30	8	22	30
STEWARD	0	22	22	0	22	22
PURSER	0	1	1	0	1	1
MEDICAL	0*	0	0	0	0	0
ALL	14	82	96	14	82	96

\*Purser is cross-trained to perform medic duties.

TABLE A-43

MANPOWER REQUIREMENTS SUMMARY  
(UNION PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP COMBAT STORESREPRESENTATIVE SHIP STUDIED AFS-3NUMBER OF SHIPS IN FLEET 7

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	9	81	90	63	567	630
ENGINE	9	23	32	63	161	224
STEWARD	0	25	25	0	175	175
PURSER	0	1	1	0	177	177
MEDICAL	0	0	0	0	0	0
ALL	18	130	148	126	910	1036

\* Purser is cross-trained to perform medic duties

TABLE A-44

MANPOWER REQUIREMENTS SUMMARY  
(UNION PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP REPLENISHMENT OILERREPRESENTATIVE SHIP STUDIED AOR-4NUMBER OF SHIPS IN FLEET 7

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	10	66	76	70	462	532
ENGINE	12	30	42	84	210	294
STEWARD	0	24	24	0	168	168
PURSER	0	2	2	0	14	14
MEDICAL	0*	0	0	0	0	0
ALL	22	122	144	154	854	1008

\*Purser is cross-trained to perform medic duties

TABLE A-45

MANPOWER REQUIREMENTS SUMMARY  
(UNION PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP FAST COMBAT SUPPORTREPRESENTATIVE SHIP STUDIED AOE-3NUMBER OF SHIPS IN FLEET 4

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	10	84	94	40	336	376
ENGINE	12	41	53	48	164	212
STEWARD	0	26	26	0	104	104
PURSER	0	2	2	0	8	8
MEDICAL	0*	0	0	0	0	0
ALL	22	153	175	88	612	700

\*Purser is cross-trained to perform medic duties.

TABLE A-46

MANPOWER REQUIREMENTS SUMMARY  
(UNION PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP AMMUNITIONREPRESENTATIVE SHIP STUDIED AE-28NUMBER OF SHIPS IN FLEET 13

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	9	62	71	117	806	923
ENGINE	8	15	23	104	195	299
STEWARD	0	23	23	0	299	299
PURSER	0	0	0	0	0	0
MEDICAL	0*	0	0	0	0	0
ALL	17	100	117	221	1300	1521

\* Purser is cross-trained to perform medic duties.



TABLE A-47  
MANPOWER REQUIREMENTS SUMMARY  
(UNION PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP FLEET OILER REPRESENTATIVE SHIP STUDIED A0-177 NUMBER OF SHIPS IN FLEET 16

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	6	30	36	96	480	576
ENGINE	7	19	26	112	304	416
STEWARD	0	21	21	0	336	336
PURSER	0	1	1	0	16	16
MEDICAL	0*	0	0	0	0	0
ALL	13	71	84	208	1136	1344

\*Purser is cross-trained to perform medic duties.

TABLE A-48

MANPOWER REQUIREMENTS SUMMARY  
(UNION PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP DESTROYER TENDERREPRESENTATIVE SHIP STUDIED AD-37NUMBER OF SHIPS IN FLEET 9

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	9	28	37	81	252	333
ENGINE	8	11	19	72	99	171
STEWARD	0	61	61	0	549	549
PURSER	0	1	1	0	9	9
MEDICAL	0*	0	0	0	0	0
ALL	17	101	118	153	909	1062

\*Purser is cross-trained to perform medic duties.

TABLE A-49

MANPOWER REQUIREMENTS SUMMARY  
(UNION PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP SUBMARINE TENDERREPRESENTATIVE SHIP STUDIED AS-36NUMBER OF SHIPS IN FLEET 12

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	9	28	37	108	336	444
ENGINE	8	11	19	96	132	228
STEWARD	0	61	61	0	732	732
PURSER	0	1	1	0	12	12
MEDICAL	0*	0	0	0	0	0
ALL	17	101	118	204	1212	1416

\*Purser is cross-trained to perform medic duties.

TABLE A-50

MANPOWER REQUIREMENTS SUMMARY  
(UNION PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Heavy RepairREPRESENTATIVE SHIP STUDIED AR-6NUMBER OF SHIPS IN FLEET 4

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	9	28	37	36	112	148
ENGINE	10	21	31	40	84	124
STEWARD	0	61	61	0	244	244
PURSER	0	1	1	0	4	4
MEDICAL	0*	0	0	0	0	0
ALL	19	111	130	76	444	520

\*Purser is cross-trained to perform medic duties.

TABLE A-51

MANPOWER REQUIREMENTS SUMMARY  
(UNION PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP SALVAGEREPRESENTATIVE SHIP STUDIED ARS-41NUMBER OF SHIPS IN FLEET 6

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	5	6	11	30	36	66
ENGINE	3	5	8	18	30	48
STEWARD	0	5	5	0	30	30
PURSER	0	0	0	0	0	0
MEDICAL	0*	0	0	0	0	0
ALL	8	16	24	48	96	144

\*Purser is cross-trained to perform medic duties.



TABLE A-52

MANPOWER REQUIREMENTS SUMMARY  
(UNION PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP SALVAGE & RESCUEREPRESENTATIVE SHIP STUDIED ASR-22NUMBER OF SHIPS IN FLEET 6

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	6	7	13	36	42	78
ENGINE	6	16	22	36	96	132
STEWARD	0	9	9	0	54	54
PURSER	0	0	0	0	0	0
MEDICAL	0*	0	0	0	0	0
ALL	12	32	44	72	192	264

\*Purser is cross-trained to perform medic duties.

TABLE A-53  
MANPOWER REQUIREMENTS SUMMARY  
(UNION PERSONNEL--COMMERCIAL CONTRACT MANNING)

DEPARTMENT	MANPOWER REQUIREMENTS		TOTAL MANPOWER REQUIREMENTS	
	LICENSED	UNLICENSED	LICENSED	UNLICENSED
DECK	5	9	35	63
ENGINE	3	4	21	28
STEWARD	0	4	0	28
PURSER	0	0	0	0
MEDICAL	0*	0	0	0
ALL	8	17	56	119

\*Purser is cross-trained to perform medic duties.

TABLE A-54

MANPOWER REQUIREMENTS SUMMARY  
(UNION PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Towing & SalvageREPRESENTATIVE SHIP STUDIED ATS-1NUMBER OF SHIPS IN FLEET 3

DEPARTMENT	MANPOWER REQUIREMENTS			TOTAL MANPOWER REQUIREMENTS		
	LICENSED	UNLICENSED	TOTAL	LICENSED	UNLICENSED	TOTAL
DECK	5	9	14	15	27	42
ENGINE	3	4	7	9	12	21
STEWARD	0	4	4	0	12	12
PURSER	0	0	0	0	0	0
MEDICAL	0*	0	0	0	0	0
ALL	8	17	25	24	51	75

\*Purser is cross-trained to perform medic duties.

TABLE A-55

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

TYPE SHIP StoresREPRESENTATIVE SHIP STUDIED AF-58NUMBER OF SHIPS IN FLEET 1

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS	1	0	1	2	1	0	1	2
ADMINISTRATION	0	0	1	1	0	0	1	1
COMMUNICATIONS	1	0	15	16	1	0	15	16
SUPPLY	1	0	7	8	1	0	7	8
MEDICAL/DENTAL								
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
REPAIR								
ALL	3	0	24	27	3	0	24	27

TABLE A-56

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Combat StoresREPRESENTATIVE SHIP STUDIED AFS-3NUMBER OF SHIPS IN FLEET 7

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS	1	0	1	2	7	0	7	14
ADMINISTRATION	0	0	1	1	0	0	7	7
COMMUNICATIONS	1	0	22	23	7	0	154	161
SUPPLY	1	1	22	24	7	7	154	168
MEDICAL/DENTAL	0	0	2	2	0	0	14	14
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)	0	0	3	3	0	0	0	21
SALVAGE/RESCUE								
REPAIR								
ALL	3	1	51	55	21	7	357	385

TABLE A-57

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Replenishment OilerREPRESENTATIVE SHIP STUDIED AOR-4NUMBER OF SHIPS IN FLEET 7

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS	1	0	1	2	7	0	7	14
ADMINISTRATION	0	0	1	1	0	0	7	7
COMMUNICATIONS	1	0	21	22	7	0	147	154
SUPPLY	1	0	4	5	7	0	28	35
MEDICAL/DENTAL	0	0	2	2	0	0	14	14
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
REPAIR								
ALL	3	0	29	32	21	0	203	224



TABLE A-58

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

Fast Com-  
bat Support

TYPE SHIP

REPRESENTATIVE SHIP STUDIED

AOE-3

NUMBER OF SHIPS IN FLEET

4

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS	1	0	1	2	4	0	4	8
ADMINISTRATION	0	0	1	1	0	0	4	4
COMMUNICATIONS	1	0	21	22	4	0	84	88
SUPPLY	1	0	4	5	4	0	16	20
MEDICAL/DENTAL	0	0	2	2	0	0	8	8
GUARD	1	1	10	12	4	4	40	48
(EXPLOSIVE ORD. DISPOSAL)	0	0	2	2	0	0	8	8
STEWARD								
(COMBAT INF. CENTER)	0	0	3	3	0	0	12	12
SALVAGE/RESCUE								
REPAIR								
ALL	4	1	44	49	16	4	176	196

TABLE A-59

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

TYPE SHIP AmmunitionREPRESENTATIVE SHIP STUDIED AE-28NUMBER OF SHIPS IN FLEET 13

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS	1	0	1	2	13	0	13	26
ADMINISTRATION	0	0	1	1	0	0	13	13
COMMUNICATIONS	1	0	13	14	13	0	169	182
SUPPLY	1	0	11	12	13	0	143	156
MEDICAL/DENTAL	0	0	2	2	0	0	26	26
GUARD	1	1	6	8	13	13	78	104
(EXPLOSIVE ORD. DISPOSAL)	0	0	2	2	0	0	26	26
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
REPAIR								
ALL	4	1	36	41	52	13	468	533

TABLE A-60

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Fleet Oiler

REPRESENTATIVE SHIP STUDIED

AO-177

NUMBER OF SHIPS IN FLEET 16

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS	1	0	1	2	16	0	16	32
ADMINISTRATION	0	0	1	1	0	0	16	16
COMMUNICATIONS	1	0	12	13	16	0	192	208
SUPPLY	0	0	3	3	0	0	48	48
MEDICAL/DENTAL								
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
REPAIR								
ALL	2	0	17	19	32	0	272	304

TABLE A-61

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Destroyer TenderREPRESENTATIVE SHIP STUDIED AD-37NUMBER OF SHIPS IN FLEET 9

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS								
ADMINISTRATION								
COMMUNICATIONS	1	0	26	27	9	0	234	243
SUPPLY	5	1	110	116	45	9	990	1,044
MEDICAL/DENTAL	6	0	22	28	54	0	198	252
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
REPAIR	2	7	526	535	18	63	4,734	4,815
ALL	14	8	684	706	126	72	6,156	6,354

TABLE A-62

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Submarine TenderREPRESENTATIVE SHIP STUDIED AS-36NUMBER OF SHIPS IN FLEET 12

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS								
ADMINISTRATION								
COMMUNICATIONS	1	0	26	27	12	0	312	324
SUPPLY	7	1	53	61	84	12	636	732
MEDICAL/DENTAL	6	0	22	28	72	0	264	336
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
REPAIR	8	7	653	668	96	84	7,836	8,016
ALL	22	8	754	784	264	96	9,048	9,408



TABLE A-63

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Heavy RepairREPRESENTATIVE SHIP STUDIED AR-6NUMBER OF SHIPS IN FLEET 4

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS								
ADMINISTRATION								
COMMUNICATIONS	1	0	27	28	4	0	108	112
SUPPLY	4	0	70	74	16	0	280	296
MEDICAL/DENTAL	3	1	14	18	12	4	56	72
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
REPAIR	2	5	237	244	8	20	948	976
ALL	10	6	348	364	40	24	1,392	1,456



TABLE A-64

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

TYPE SHIP SalvageREPRESENTATIVE SHIP STUDIED ARS-41NUMBER OF SHIPS IN FLEET 6

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS								
ADMINISTRATION								
COMMUNICATIONS	0	0	8	8	0	0	48	48
SUPPLY								
MEDICAL/DENTAL								
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
REPAIR								
ALL	0	0	8	8	0	0	48	48

TABLE A-65

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Salvage & RescueREPRESENTATIVE SHIP STUDIED ASR-22NUMBER OF SHIPS IN FLEET 6

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS	1	0	1	2	6	0	6	12
ADMINISTRATION	0	0	1	1	0	0	6	6
COMMUNICATIONS	0	0	12	12	0	0	72	72
SUPPLY								
MEDICAL/DENTAL	0	0	3	3	0	0	18	18
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE	1	0	9	10	6	0	54	60
REPAIR								
ALL	2	0	26	28	12	0	156	168

TABLE A-66

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

TYPE SHIP TowingREPRESENTATIVE SHIP STUDIED ATF-166NUMBER OF SHIPS IN FLEET 7

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS								
ADMINISTRATION								
COMMUNICATIONS	0	0	10	10	0	0	70	70
SUPPLY								
MEDICAL/DENTAL								
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE								
REPAIR								
ALL	0	0	10	10	0	0	70	70

TABLE A-67

MANPOWER REQUIREMENTS SUMMARY  
(MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING).

TYPE SHIP Towing & SalvageNUMBER OF SHIPS IN FLEET 3

ATS-1

REPRESENTATIVE SHIP STUDIED

FUNCTION	MANPOWER REQUIREMENTS				TOTAL MANPOWER REQUIREMENTS			
	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES	OFFICERS	WARRANT OFFICERS	ENLISTED	TOTAL ALL GRADES
OPERATIONS								
ADMINISTRATION								
COMMUNICATIONS	0	0	7	7	0	0	21	21
SUPPLY								
MEDICAL/DENTAL								
GUARD								
(EXPLOSIVE ORD. DISPOSAL)								
STEWARD								
(COMBAT INF. CENTER)								
SALVAGE/RESCUE	1	0	7	8	3	0	21	24
REPAIR								
ALL	1	0	14	15	3	0	42	45

Appendix These manpower requirements are also summarized in Table A-2.

12. Table A-2 compares the total manpower requirements for the operation of the ships under study for each of the manning alternatives.

13. For the ships studied, military manpower requirements are significantly greater than those of either of the civilian manning alternatives. This is partially due to the fact that the crews of Navy ships are sized to Condition I (Battle) Readiness. Navy military personnel man self defense weapons and weapon control stations, operate Combat Information Centers (CIC) and man damage control/repair party stations when in contact with enemy forces. Civilian crews do not perform military functions related to the defense of their ship. Thus the study investigates Condition III (Cruising) Readiness only in achieving the study objectives. In addition Navy military crewed ships provide many administrative services not required by civilian crewed ships, e.g., laundry, pay, postal services, and ships stores. Finally, since about 40% of the Navy military crew are non-rated, there is a requirement to provide training aboard ship.

14. The Navy Civil Service and Commercial Contract manning alternatives require similar manning levels. Both MSC's and MARAD's estimates are based on merchant marine manning practices. Optimization of manning is achieved by



cross-training of off-watch personnel for UNREP operations, and scheduling work hours to match support requirements.

B. REDUCED NAVY MILITARY SHIP MANNING

The following analyses examine the philosophy of Navy and civilian manning:

1. AOE Class

a. The Ship Manning Document (SMD) for the AOE 1 Class fleet support ship has established Navy manpower requirements at 23 officers and 545 enlistees. The Military Sealift command (MSC) would man the same ship with 30 licensed officers and 129 unlicensed seamen augmented by a 40 man MILDET. The U.S. Maritime Administration (MARAD) estimates a crew of 22 licensed officers and 153 unlicensed seamen for the AOE. The following examines Navy and Navy Civil Service ship manning practices to explain the differences between the size of the Navy Military and Civil Service crews.

b. This analysis compares Navy vis-a-vis Navy Civil Service manning in two operational modes: 1) Manning Readiness Condition III (three section watch at sea) and 2) Underway Replenishment. It continues with a synopsis and comparison of operations and maintenance practices aboard Navy Military and civilian manned ships, which account for the Navy's greater use of non-watchstanding support personnel. The analysis shows a rational reduction of Navy manpower levels. These levels approximate those proposed by MSC.

c. The AOE's primary role is to replenish aircraft carrier task groups. The Projected Operational Environment (POE) statements for this ship requires that it be capable of transferring fuel, ammunition and stores simultaneously (wartime) from 10 Connected Replenishment (CONREP) Stations and one Vertical Replenishment (VERTREP) Helicopter Landing Station for periods not exceeding 32 hours per week. The secondary role of the Navy manned AOE is to contribute to the overall defense of the task group in the area of operations. However, the military functions related to this role are deleted when a Navy Civil Service crew replaces the Navy Military crew.

d. Navy manpower requirements are:

<u>Operating Condition</u>	<u>No. of Stations Manned</u>	<u>No. OFF/ENL. Billets Required</u>
Condition III	48 <sup>a</sup>	6/138
Replenishment	290	10/280

MSC manpower requirements are:

<u>Operating Condition</u>	<u>No. of Stations Manned</u>	<u>Lic./Unlic. Billets Required</u>
Condition III	14 <sup>a</sup>	15/27
Replenishment	130	14/116

e. Table A-68 shows the allocation of Navy Military and Navy Civil Service personnel at ship and engineering control stations shown in the AOE Ship Manning Document. Civil Service manned ships rely upon unattended

---

<sup>a</sup> Ship control personnel

TABLE A-68

COMPARISON OF NAVY CIVIL SERVICE MANNING  
 VIS-A-VIS NAVY MILITARY MANNING ON AOE  
 UNDERWAY SHIP & ENGINE CONTROL

<u>STATION</u>	<u>NAVY (SMD) OFF/ENL</u>	<u>MSC LIC./UNLIC.</u>
Ship Control		
Bridge	2/9	1/3
Aft Steering	0/2	---
Sub-Total	2/11	1/3
Engine Control		
Fwd Fireroom/Engineerom	0/16	2/2
After Fireroom/Engineerom	0/16	2/2
I.C. Room	0/1	
Damage Control	0/2	0/2
Sub-Total	0/35	4/6
TOTAL	2/46	5/9

Number Stations Manned X 3 = Number Men Required

Navy (SMD) OFF/ENL	48	6/138
MSC (LIC/UNLIC)	14	15/ 27

machinery and existing automation to minimize manpower requirements. Navy manning practices place personnel at many control stations to provide training and for a greater level of casualty and damage control during all sustained ship operations.

f. Navy Ship Manning Documents establish manpower requirements based upon work study analysis which incorporate time spent for condition manning, maintenance, fleet support operations, and own-ship support operations. Similar figures are not available for MSC and MARAD. The division of workload for the Navy manned AOE in percent of total hours is as follows:

Operations Manning (Condition Watches)	26%
Replenishment Manning	20%
Maintenance and Own-Ship Support Manning	38%
Training, Diversions, etc.	16%
	<u>100%</u>

g. Based upon a manpower work output of 74 hours for watchstanders and 66 for non-watchstanders per week, a crew of 23 officers and 545 enlisted men are needed to operate and maintain the AOE.

h. Table A-69 illustrates what the manning requirements would be if the Navy were to reduce its personnel aboard the AOE-2 class ship by deleting certain functions and upgrading rates commensurate with Navy Civil Service manning experience levels. It should be noted, however, that Navy maintenance requirements (3-M system) are also a determining factor in fixing the Navy military crew

TABLE A-69

NAVY MILITARY MANNING ON AOE  
VIS-A-VIS NAVY CIVIL SERVICE MANNING

<u>Navy Military Manning</u>		<u>Navy Civil Service Manning</u>	
Officers	23	Officers	30
Enlisted	<u>545</u>	Unlicensed Seamen	<u>129</u>
Subtotal	568	Subtotal	159
Reductions:			
Officers (Note 1)	5		
Admin (Note 3)	17		
Operations (Note 3)	18		
Deck (Note 4)	132		
Weapons (Note 5)	30		
Engineering (Note 6)	68		
Supply (Note 7)	50		
Medical (Note 8)	<u>2</u>		
Subtotal	<u>322</u>		
	246		
Additions:		Military Detachments:	
Helo Detachment	22	Helo Detachment	22
		Communications	25
		Security Watch	
		& EOD	<u>15</u>
		Subtotal	<u>62</u>
TOTAL	<u>268</u>		221

Note 1. Deletes Gunnery, CIC, Electronic, Medical Officers and Chaplain.

Note 2. Deletes journalists, MAA, legal YN, postal clerks, excess YN & PN.

Note 3. Deletes all CIC personnel and 3 of 5 ETs.

Note 4. Deletes 132 non-rated personnel.

Note 5. Deleted 30 of 36 GM. Six billets reserved for Guard Security Force.

Note 6. Deletes 45 non-rated personnel, "A" & "E" Div. non-watchstanders. UNREP repair party retained.

Note 7. Deletes 39 non-rated personnel, laundrymen, ship storekeeper, etc.

Note 8. Reduces Medical From 5 to 3.



size--thus any reductions in Navy crewmen would require an assessment of this reduction upon maintenance requirements. Table A-70 compares the manpower requirements of reduced Navy military manning to that of the Navy Civil service manned AOE.

i. By reconfiguring the Navy military crew to more closely match the skill levels of the civilian manned ship, the percentage of petty officers would rise from the approximately 42% specified in the SMD to 74%.

## 2. AE Class

a. MSC proposes to operate a representative AE 21 class fleet support ship with 121 Civil Service mariners. An additional 27 man military detachment is aboard to perform communication and other special duties. The Navy SMD for the AE 21 calls for 329 military men in two operational modes: 1) Manning Readiness Condition III (steady steaming), and 2) during underway replenishment. Table A-71 shows the MSC and Navy military manpower requirements for a 3 section watch.

b. The AE 21 has a combined machinery space; i.e., engineroom and fireroom, and automated boilers. MSC mans engineering control with as few men as possible consistent with safety and merchant marine practices. Automatic steering, when installed, is used. When the ship enters and leaves port, or maneuvers in company with other ships during an UNREP, MSC assigns additional watch standers to the

TABLE A-70

AOE CLASS. ORGANIZATIONAL MANPOWER  
 REQUIREMENTS, REVISED NAVY MILITARY  
 VIS-A-VIS NAVY CIVIL SERVICE MANNING

<u>DEPARTMENT</u>	<u>Navy Civil Service</u>		<u>Navy Military</u>	
	<u>LICENSED</u>	<u>UNLICENSED</u>	<u>OFFICER</u>	<u>ENLISTED</u>
Deck	6	45	9	90 (Note 2)
Engine	24 (Note 1)	44	4	90
Steward	--	33	1	12
Purser	--	6	4	33 (Note 3)
Medical	--	1	-	3
Mil. Det. (Note 4 & 5)	<u>8</u>	<u>54</u>	<u>6</u>	<u>16</u>
Subtotals	38	183	24	244
Ship Manning				
Totals		221		268

Note 1. Licensed Engine Officers equate to Navy EOOW<sup>1/</sup> CPOs.

Note 2. Includes communication detachment.

Note 3. Includes all cargo administration and management.

Note 4. Includes communications, EOD team, and Guard and Security Force.

Note 5. Military Detachment includes 6 officers and 16 enlisted aviation oriented ratings to operate and maintain 2 helicopters.

<sup>1/</sup>Engineer Officer of the Watch

## TABLE A-71

MANNING READINESS CONDITION III WATCH  
NAVY/MSC MANPOWER REQUIREMENTS  
AE-21/28 CLASS

<u>STATION</u>	<u>NAVY</u> <u>BILLETS</u>	<u>MSC</u> <u>BILLETS</u>
<u>STATION CONTROL</u>		
<u>Pilot House</u>		
Watch Officer	1	1
Jr. Watch Officer	1	
Quartermaster of the Watch	1	
Boatswain Mate of the Watch	1	1
Helmsman	1	1
Eng. Order Telegraph/1 JV	1	
Port Lookout	1	1 (Forward)
Starboard Lookout	1	
Bridge Messenger	1	
Status Board Operator/JL	1	
<u>Steering Aft</u>		
Helmsman	1 <u>11</u>	<u>4</u>
<u>ENGINEERING CONTROL</u>		
<u>Engineroom</u>		
Watch Officer	1	1
Petty Officer in charge/upper level/gen.	1	1
Throttleman/1 JV	1	
Log Recorder/Messenger	1	
Lower levelman	1	1
Switchboard Operator	1	1
Evaporator Operator	1	
<u>Fireroom</u>		
Petty Officer in charge	1	1
#1 Burnerman	1	
#2 Burnerman	1	
Log Recorder/Messenger	1	
Auxiliaryman (Pumps)	1	
Checkman	1	
<u>Auxiliary</u>		
IC Gyro Watch	1	
<u>Damage Control Central</u>		
Petty Officer in Charge	1	1
Sounding & Security	1 <u>16</u>	<u>1</u> <u>7</u>
TOTAL PER WATCH	27	11
TOTAL WATCH REQUIREMENTS (3 section)	81	33

bridge and engine room. A machinist and helmsman are also stationed in the steering aft.

c. The Navy's Required Operational Capabilities/Project Operational Environment Statement (ROC/POE) requires that the AE 21 class ship be capable of simultaneous (war-time) transfer of ammunition from 6 stations (4 stations port and 2 stations starboard), and stores, fleet freight, mail and personnel from 1 station either port or starboard and VERTREP. MSC's manning plan provides for simultaneous 5 station transfer capability (3 stations port and 2 stations starboard) for peacetime operations only.

d. Table A-72 shows the results of the analysis in which the Navy manned representative AE is subject to reductions in manpower in order to equate to the crew size of the MSC manned AE. Retained in the 154 man Navy crew are all men assigned to engineering, all ordnance personnel and all storekeeper personnel. The reduction of trainees removes a labor supply of 142 non-rated personnel whose duties and assignments must be performed by personnel of higher skill levels. However, the ship's petty officer level increases from 44.2% at the 329 manning level to 85% at the 154 manning level.

#### C. MANPOWER COST ANALYSES--NAVY MILITARY MANNING

1. The FYDP cost of manpower represents the annual funding appropriation necessary to meet manpower requirements for a particular ship.

TABLE A-72

COMPARISON OF NAVY MILITARY AND NAVY CIVIL  
SERVICE MANPOWER ALLOCATIONS TO UNREP  
STATIONS ABOARD AE-21 CLASS SHIPS

<u>NAVY MANNING</u>		<u>NAVY CIVIL SERVICE MANNING</u>
Officers and Enlisted	329	Licensed and Unlicensed 121
Reductions:		
Officers	0	
Non-Rated (42.5%)	142	
CIC	17	
Ships Ordnance	6	
Admin & Log		
(33 1/3%)	8	
Medical (50%)	<u>2</u>	
	-175	
Additions		
		Mil. Det (Comm) 15
		Mil. Det (Cargo) <u>12</u>
		+27
TOTALS	154	148

2. The direct FYDP manpower cost is the funding necessary for manning a ship to SMD authorized levels. Composite Standard Military Rates have been used to represent the FYDP manpower costs associated with the various military pay grades. Rates effective 1 Oct 76 have been used in accordance with POM-79-15. These have been extracted from NAVCOMPTNOTE 7041 (Oct '76) and are shown in Table A-73.

3. The Composite Standard Rate is described fully in Section X, NAVCOMPT Manual, Volume 3. The following costs are included in the rate structure:

Base Pay	BAQ
FICA (employer share)	Sea Pay
Re-enlistment Bonuses	Foreign Duty Pay
Settlement Costs	Clothing Allowance
Proficiency Pay	Subsistence Allowance
Hazardous Duty Pay	Death Gratuity
Family Separation Allowance	Life Insurance
Separation Payments	

The total direct budget cost of manpower has been computed as follows:

$$M_b = \sum_{i=1}^6 O_i A_i + \sum_{i=1}^4 W_i B_i + \sum_{i=2}^9 E_i C_i$$

where:  $M_b$  = Total Direct FYDP Cost of Manpower

$O_i$  = Officer Composite Rate, by grade (O-1 thru O-6)

$W_i$  = Warrant Officer Composite Rate, by grade (W-1 thru W-4)

$E_i$  = Enlisted Composite Rate, by grade (E-2 thru E-9)

$A_i$  = SMD authorized officer strength, by grade

$B_i$  = SMD authorized Warrant Officer Strength, by grade

$C_i$  = SMD authorized Enlisted strength, by grade



TABLE A-73  
Manpower Costs by Pay Grade

<u>PAY GRADE</u>	(BUDGET) COMPOSITE STANDARD	(ECONOMIC)
	<u>MILITARY RATE</u>	<u>BILLET COST</u>
O-6	36,176	72,714
O-5	30,118	50,598
O-4	25,312	40,752
O-3	22,544	35,394
O-2	16,786	30,382
O-1	12,063	22,316
W-4	23,302	40,778
W-3	19,035	33,311
W-2	16,279	28,488
W-1	14,273	24,977
E-9	19,436	26,704
E-8	16,894	24,121
E-7	14,696	21,611
E-6	12,550	18,258
E-5	10,395	14,538
E-4	8,624	12,043
E-3	7,635	10,582
E-2	6,965	9,898

These costs were effective as of 1 Oct 76

4. Manpower FYDP cost comparasions are shown in Tables A-74 through A-86. The FYDP cost shown is comparable to the annual direct Military Personnel, Navy (MPN) shown in the Navy Program Factors Manual, Volume 1, dated 1 July 1976. The actual amounts, however, are not the same because the Factors Manual uses only one pay factor for officers and one for enlisted (\$21,427 and \$9,248 respectively). Also, in order to obtain an average enlisted man's pay, the Navy Resource Model (NARM) averages the salaries of all enlisted personnel across all Navy ships, whereas the actual rates aboard auxilliary ships do not necessarily follow that distribution.

5. The economic cost of manpower represents the total cost to the Department of Defense of the manpower utilized to operate each representative support ship under study. These economic costs differ significantly from appropriation oriented (budget) costs in that they include accrued and deferred costs (such as "downtime" and retirement costs) which are incurred by the U.S. Government.

6. Economic manpower costs, as used in this study, are based on the Navy Billet Cost Model (NBCM). This model estimates the annual life cycle cost incurred by DOD, for the manning of an established or proposed billet aboard a ship. In accordance with POM 79-15<sup>1/</sup>, billet costs effective 1 October 1976 have been used.

---

<sup>1/</sup>Office of the Chief of Naval Operations, Memorandum No. 79-15, Dept. of Navy, dated 6 Jan 1977.

TABLE A-74

MANPOWER COST ANALYSIS SUMMARY  
(NAVY MILITARY MANNING)  
COST IN THOUSANDS OF DOLLARS

TYPE SHIP: <u>Stores</u>		REPRESENTATIVE SHIP STUDIED: <u>AF-58</u>		NUMBER OF SHIPS IN FLEET: <u>1</u>	
DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET	
DECK	1,062	1,527	1,062	1,527	
ENGINE	779	1,121	779	1,121	
STEWARD	0	0	0	0	
PURSER	475	685	475	685	
MEDICAL	0	0	0	0	
COMMUNICA- TIONS	93	137	93	137	
REPAIR	0	0	0	0	
ALL DIVISIONS	2,409	3,471	2,409	3,471 <sup>1/</sup>	

1/ Errors Due To Rounding

TABLE A-75

MANPOWER COST ANALYSIS SUMMARY  
(NAVY MILITARY MANNING)  
COST IN THOUSANDS OF DOLLARS

TYPE SHIP: Combat StoresREPRESENTATIVE SHIP STUDIED: AFS-3NUMBER OF SHIPS IN FLEET: 7

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	1,669	2,421	11,683	16,944
ENGINE	1,143	1,639	8,001	11,473
STEWARD	363	518	2,541	3,628
PURSER	811	1,177	5,676	8,236
MEDICAL	72	105	504	735
COMMUNICA- TIONS	225	325	1,575	2,276
REPAIR	0	0	0	0
ALL DIVISIONS	4,282	6,185	29,974	43,295 <sup>1/</sup>

1/ Errors Due To Rounding

TABLE A-76

MANPOWER COST ANALYSIS SUMMARY  
(NAVY MILITARY MANNING)  
COST IN THOUSANDS OF DOLLARS

TYPE SHIP: Replenishment OilerREPRESENTATIVE SHIP STUDIED: AOR-4NUMBER OF SHIPS IN FLEET: 7

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	1,723	2,468	11,994	17,275
ENGINE	1,224	1,765	8,637	12,354
STEWARD	293	412	2,051	2,884
PURSER	431	621	3,015	4,345
MEDICAL	64	94	447	659
COMMUNICA- TIONS	225	325	1,575	2,276
REPAIR	0	0	0	0
ALL DIVISIONS	3,960	5,685	27,720	39,794 <sup>1/</sup>

<sup>1/</sup> Errors Due To Rounding



TABLE A-77

MANPOWER COST ANALYSIS SUMMARY  
(NAVY MILITARY MANNING)

COST IN THOUSANDS OF DOLLARS

TYPE SHIP: Fast Combat SupportREPRESENTATIVE SHIP STUDIED: AOE-3NUMBER OF SHIPS IN FLEET: 4

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	2,326	3,347	9,304	13,388
ENGINE	1,775	2,524	7,100	10,096
STEWARD	422	600	1,689	2,403
PURSER	485	704	1,940	2,815
MEDICAL	72	105	286	419
COMMUNICA- TIONS	225	325	900	1,301
REPAIR	0	0	0	0
ALL DIVISIONS	5,305	7,605	21,219	30,421 <sup>1/</sup>

<sup>1/</sup> Errors Due To Rounding



TABLE A-78

MANPOWER COST ANALYSIS SUMMARY  
(NAVY MILITARY MANNING)

COST IN THOUSANDS OF DOLLARS

TYPE SHIP: Ammunition      REPRESENTATIVE SHIP STUDIED: AE-28      NUMBER OF SHIPS IN FLEET: 13

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	1,886	2,707	24,518	35,191
ENGINE	983	1,406	12,779	18,278
STEWARD	241	339	3,127	4,410
PURSER	227	329	2,945	4,271
MEDICAL	54	81	702	1,053
COMMUNICA- TIONS	203	292	2,637	3,790
REPAIR	0	0	0	0
ALL DIVISIONS	3,594	5,153	46,722	66,989 <sup>1/</sup>

1/ Errors Due To Rounding

TABLE A-79

MANPOWER COST ANALYSIS SUMMARY  
(NAVY MILITARY MANNING)  
COST IN THOUSANDS OF DOLLARS

TYPE SHIP: <u>Fleet Oiler</u>		REPRESENTATIVE SHIP STUDIED: <u>AO-177</u>		NUMBER OF SHIPS IN FLEET: <u>16</u>	
DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET	
DECK	773	1,118	12,368	17,888	
ENGINE	662	952	10,596	15,228	
STEWARD	152	213	2,432	3,414	
PURSER	118	172	1,886	2,755	
MEDICAL	0	0	0	0	
COMMUNICA- TIONS	132	192	2,106	3,077	
REPAIR	0	0	0	0	
ALL DIVISIONS	1,837	2,648	29,392	42,368 <sup>1/</sup>	

<sup>1/</sup> Errors due To Rounding

TABLE A-80

MANPOWER COST ANALYSIS SUMMARY  
(NAVY MILITARY MANNING)  
COST IN THOUSANDS OF DOLLARS

TYPE SHIP: <u>Destroyer Tender</u>		NUMBER OF SHIPS IN FLEET: <u>9</u>			
REPRESENTATIVE SHIP STUDIED: <u>AD-37</u>		ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DEPARTMENT					
DECK	1,724		2,477	15,518	22,294
ENGINE	1,713		2,428	15,415	21,852
STEWARD	855		1,205	7,691	10,846
PURSER	1,126		1,617	10,136	14,553
MEDICAL	359		539	3,235	4,854
COMMUNICA- TIONS	272		392	2,451	3,525
REPAIR	5,396		7,686	48,568	69,171
ALL DIVISIONS	11,446		16,344	103,014	147,095 <sup>1/</sup>

<sup>1/</sup> Errors Due To Rounding

TABLE A-81

MANPOWER COST ANALYSIS SUMMARY  
(NAVY MILITARY MANNING)  
COST IN THOUSANDS OF DOLLARS

TYPE SHIP: Submarine Tender      REPRESENTATIVE SHIP STUDIED: AS-36      NUMBER OF SHIPS IN FLEET: 12

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	1,384	2,000	16,608	24,000
ENGINE	1,661	2,358	19,932	28,295
STEWARD	431	612	5,172	7,344
PURSER	708	1,043	8,496	12,516
MEDICAL	383	575	4,596	6,900
COMMUNICA- TIONS	270	386	3,240	4,632
REPAIR	7,043	10,063	84,516	120,756
ALL DIVISIONS	11,879	17,038	142,548	204,456 <sup>1/</sup>

<sup>1/</sup> Errors Due To Rounding



TABLE A-82

MANPOWER COST ANALYSIS SUMMARY  
(NAVY MILITARY MANNING)

COST IN THOUSANDS OF DOLLARS

TYPE SHIP: Heavy Repair ShipREPRESENTATIVE SHIP STUDIED: AR-6NUMBER OF SHIPS IN FLEET: 4

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	1,374	1,981	5,496	7,922
ENGINE	1,399	1,785	5,022	7,141
STEWARD	623	882	2,493	3,530
PURSER	573	833	2,291	3,330
MEDICAL	225	335	898	1,340
COMMUNICA- TIONS	265	379	1,059	1,518
REPAIR	2,349	3,577	9,396	14,308
ALL DIVISIONS	6,808	9,772	27,232	39,088 <sup>1/</sup>

<sup>1/</sup> Errors Due To Rounding

TABLE A-83

MANPOWER COST ANALYSIS SUMMARY  
(NAVY MILITARY MANNING)  
COST IN THOUSANDS OF DOLLARS

TYPE SHIP: Salvage      REPRESENTATIVE SHIP STUDIED: ARS-41      NUMBER OF SHIPS IN FLEET: 6

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	538	787	3,229	4,721
ENGINE	416	594	2,495	3,563
STEWARD	0	0	0	0
PURSER	95	134	568	803
MEDICAL	0	0	0	0
COMMUNICA- TIONS	0	0	0	0
REPAIR	0	0	0	0
ALL DIVISIONS	1,049	1,514	6,292	9,087 <sup>1/</sup>

<sup>1/</sup> Errors Due To Rounding



TABLE A-84

MANPOWER COST ANALYSIS SUMMARY  
(NAVY MILITARY MANNING)  
COST IN THOUSANDS OF DOLLARS

TYPE SHIP: <u>Salvage &amp; Rescue</u>		NUMBER OF SHIPS IN FLEET: <u>6</u>		
REPRESENTATIVE SHIP STUDIED: <u>ASR-22</u>		ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, FLEET
DECK	1,195	1,729	7,172	10,376
ENGINE	602	862	3,610	5,172
STEWARD	163	230	980	1,380
PURSER	95	141	571	847
MEDICAL	0	0	0	0
COMMUNICA- TIONS	0	0	0	0
REPAIR	0	0	0	0
ALL DIVISIONS	2,056	2,963	12,333	17,776 <sup>1/</sup>

<sup>1/</sup> Errors Due To Rounding

TABLE A-85

MANPOWER COST ANALYSIS SUMMARY  
(NAVY MILITARY MANNING)  
COST IN THOUSANDS OF DOLLARS

TYPE SHIP: TowingREPRESENTATIVE SHIP STUDIED: ATF-166 NUMBER OF SHIPS IN FLEET 7

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	156	236	1,092	1,652
ENGINE	176	245	1,232	1,715
STEWARD	0	0	0	0
PURSER	59	83	413	581
MEDICAL	0	0	0	0
COMMUNICA- TIONS	106	161	742	1,127
REPAIR	0	0	0	0
ALL DIVISIONS	497	725	3,479	5,075 <sup>1/</sup>

1/ Errors Due To Rounding

TABLE A-86

MANPOWER COST ANALYSIS SUMMARY  
(NAVY MILITARY MANNING)

COST IN THOUSANDS OF DOLLARS

TYPE SHIP: Towing & SalvageREPRESENTATIVE SHIP STUDIED: ATS-1NUMBER OF SHIPS IN FLEET: 3

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	597	872	1,791	2,617
ENGINE	525	746	1,576	2,239
STEWARD	0	0	0	0
PURSER	194	279	582	837
MEDICAL	0	0	0	0
COMMUNICA- TIONS	0	0	0	0
REPAIR	0	0	0	0
ALL DIVISIONS	1,317	1,898	3,950	5,694 <sup>1/</sup>

1/ Errors Due To Rounding

7. While the NBCM computes the cost of each billet relative to pay grade and occupational specialty,<sup>1/</sup> the mean Billet Cost for each pay grade has been used in calculating economic costs. This mean was computed as follows for enlisted personnel:

$$\bar{C}_j = \frac{\sum_{i=1}^N C_{ij}}{N}$$

Where:  $\bar{C}_j$  = mean billet cost for pay grade j

j = 2, ..., 9 (i.e., pay grades (E-2 through E-9))

$C_{ij}$  = billet cost for NEC i, pay grade j

N = number of NECs = 95

8. Billet cost data for each of the various NECs was obtained from NAVPERS. The results of mean billet cost calculations for each pay grade are given in Table A-73.

9. The decision to use the mean billet cost was made in order to simplify computations (there are 736 individual billet costs computed for enlisted personnel alone). A sensitivity test was conducted to determine the appropriateness of this decision. This test utilized the authorized enlisted SMD manning levels for the AE-23 (USS SANTA BARBARA). The actual billet cost was computed using the billet cost of each enlisted crew member (determined relative to paygrade and NEC wherever identifiable), and the

---

<sup>1/</sup>Navy Enlisted Classification (NEC) Code.

estimated billet cost was computed using the mean billet cost for each paygrade. The results of these computations are shown below:

Estimated Billet cost of Enlisted Manpower	=	\$4,611,806
Actual Billet cost of Enlisted Manpower	=	\$4,575,734
Difference	=	\$ 36,072

$$\% \text{ Error} = \frac{\$36,072}{\$4,574,734} \times 100 = .79\%$$

10. The resulting error of .79% was determined to be insignificant for the purposes of this study, and the mean billet cost has therefore been used to compute the economic cost of enlisted manpower for all ships under study.

11. Billet Costs for officer personnel were not available for 1976. These costs were therefore estimated for officer grades 0-1 through 0-6 as follows:

$$\text{Billet Cost (1976)}_i = \frac{\text{Billet Cost (1974)}_i}{\text{Composite Rate (1974)}_i} \times \text{Composite Rate (1976)}_i$$

where  $i=1, \dots, 6$  (0-1 through 0-6)

12. This method of estimation assumes that the ratios of billet costs to composite rates for officer grades has remained constant since 1974 (the last year for which officer billet costs were calculated).

13. This assumption is considered to be valid for the purpose of this study based upon the fact that billet cost to composite rate ratios computed for 1972 and 1973 vary less than 10% with each other and with the ratios computed



for 1974. The results of computations of officer billet costs are given in Table A-73.

14. No Billet Cost Model has been developed by the Navy for warrant officer personnel. Therefore billet cost for these personnel were also required to be estimated. Based upon a historical review of the relationships between officer billet costs, officer composite rates, and warrant officer composite rates, the following estimate of warrant officer billet costs was developed.

$$\text{Billet Cost (1976)}_i = 1.75 \times \text{Composite Rate (1976)}_i$$
where  $i=1, \dots, 4$  (W-1 through W-4).

15. Billet costs estimated for warrant officers are found in Table A-73. It should be noted that these costs track very closely with officer grades 1 through 4 and can therefore be considered valid within reasonable limits.

16. The sensitivity of the total economic cost of manpower to any errors resulting from the procedures used to estimate officer and warrant officer billet costs will be very small due to the fact that officer and warrant officer costs constitute a relatively small portion of total crew cost. The sensitivity of the estimate was tested by assuming that the billet cost estimates for one ship (AOE-4) are in fact exactly correct, and then examining the effect of varying officer and warrant officer costs. The billet cost estimates for the sample are:

Officer & Warrant Officers	= \$	791,052
Enlisted Personnel	= \$	6,814,255
Total	= \$	7,605,307

17. By varying the estimate for officers and warrant officers by 25% in each direction the following estimates are arrived at:

	(25% low)	(25% high)
Officer & Warrant Officers	\$ 593,289	\$ 988,815
Enlisted Personnel	\$6,814,225	\$6,814,225
Total	\$7,407,514	\$7,803,040

% Error from Original Total Ship Estimate	2.6%	2.6%
---	------	------

18. Thus, it is seen that even a 25% estimation error in officer and warrant officer costs results in only a 2.6% variance in total ship cost. In summary, the accuracy of total ship manpower cost is relatively insensitive to the officer and warrant officer cost estimates.

19. The cost model used to compute the total economic cost of manpower for each representative ship under study is as follows:

$$M_e = \sum_{i=1}^6 \left( \frac{D_i}{E_i} \right) O_i A_i + \sum_{i=1}^4 (1.75) W_i B_i + \sum_{i=2}^9 J_i C_i$$

where:  $M_e$  = Total Economic Cost of Manpower

$A_i$  = SMD authorized Officer strength, by grade  
(O-1 through O-6)

$B_i$  = SMD authorized Warrant Officer strength, by grade  
(W-1 through W-4)

$C_i$  = SMD authorized Enlisted strength, by grade  
(E-2 through E-9)

$D_i$  = Officer Billet cost (1974), by grade

$E_i$  = Officer composite rate (1974), by grade

$J_i$  = Mean enlisted billet cost (1976), by grade

$O_i$  = Officer composite rate, (1976), by grade

$W_i$  = Warrant officer composite rate (1976), by grade

D. MANPOWER COST ANALYSES--NAVY CIVIL SERVICE MANNING

1. The direct manpower FYDP cost is the funding necessary for manning a ship to the Civil Service personnel and Navy Military detachment personnel strength levels provided by MSC.

2. Civil Service Personnel FYDP cost computations were based on the following cost data inputs provided by MSC:

Base Pay	Ammunition Differential
Overtime Pay	Pay
Premium/Penalty Pay	Travel
Subsistence	Annual Sick and Military
Retirement <sup>1/</sup>	Leave
Ammunition Handling	Insurance (Medical and
Bonus Pay	Life)
Other (Relief Officers, Awaiting Assignment, Training, Damage Control, Instruction)	Shore Leave

This cost data was provided by MSC in fiscal year 76 dollars and was escalated to fiscal year 77 dollars prior to the computation of Civil Service manpower costs to allow comparison with Navy military manning. <sup>2/</sup>

---

<sup>1/</sup>Computed as seven percent of Base Pay

<sup>2/</sup>An escalation factor of 1.05 was provided by COMSC for this purpose

3. The total direct FYDP cost of Civil Service manpower for each ship department has been computed as follows:

$$C_d = S \sum_i^k N_i + \sum_i^k B_i N_i + \sum_i^k O_i N_i + \sum_i^k P_i N_i + \frac{1}{M} \sum_i^k A N_i + .1 \sum_i^k B_i N_i$$

where:  $C_d$  = Total Direct Annual Manpower Cost, Each Department

$S$  = Annual Subsistence Cost per Man

$N$  = Number of Personnel in MSC Skill Code

$B$  = Base Pay

$O$  = Overtime Pay

$P$  = Penalty/Premium Pay

$A$  = Ammunition Handling Bonus Pay, Ship Total

$M$  = Number of Civil Service Personnel, Ship Total

$i$  thru  $k$  = MSC Skill Code

4. The term  $\frac{1}{M} \sum_i^k A N_i$  represents the bonus paid to Civil

Service personnel for handling ammunition. The term  $.1 \sum_i^k B_i N_i$

represents the ammunition differential pay received by all Civil Service personnel for serving aboard a ship carrying 50 tons or more ammunition (ten per cent of their base pay).

5. The total direct FYDP cost of Civil Service manpower for each ship was computed as follows:

$$C_x = C_d + C_e + C_p + C_s + C_m$$

where:  $C_x$  = Total Direct Civil Service Manpower Cost,  
Ship

$C_d$  = Total Direct Civil Service Manpower Cost,  
Deck Department

$C_e$  = Total Direct Civil Service Manpower Cost,  
Engine Department

$C_p$  = Total Direct Civil Service Manpower Cost,  
Purser Department

$C_s$  = Total Direct Civil Service Manpower Cost,  
Steward Department

$C_m$  = Total Direct Civil Service Manpower Cost,  
Medical Department

6. The total indirect FYDP cost of Civil Service manpower for each ship department has been computed as follows:

$$I_d = .07 \sum_i^k B_i N_i + \sum_i^k Q_i N_i + \frac{1}{M_i} \sum_i^k (T N_i + L N_i + K N_i + R N_i)$$

where:  $I_d$  = Total Indirect Manpower Cost, Each Department

$B$  = Base Pay

$Q$  = Shore Leave

$N$  = Number of Personnel in MSC Skill Code

$T$  = Travel Pay, Ship Total

$L$  = Annual Sick and Military Leave, Ship Total

$K$  = Medical and Life Insurance, Ship Total

$R$  = Other Costs, Ship Total

$M$  = Number of Civil Service Personnel, Ship Total

$i$  thru  $k$  = MSC Skill Code

.07 = Retirement Rate Factor



The total indirect FYDP cost of Civil Service manpower for each ship was computed as follows:

$$I_x = I_d + I_e + I_p + I_s + I_m$$

where:  $I_x$  = Total Indirect Manpower cost, Ship

$I_d$  = Total Indirect Manpower Cost, Deck Department

$I_e$  = Total Indirect Manpower Cost, Engine Department

$I_p$  = Total Indirect Manpower Cost, Purser Department

$I_s$  = Total Indirect Manpower Cost, Steward Department

$I_m$  = Total Indirect Manpower Cost, Medical Department

7. The total Annual FYDP manpower cost of each department is computed as follows:

$$T_d = C_d + I_d$$

where:  $T_d$  = Total Annual FYDP Manpower cost, Department

$C_d$  = Total Annual Direct FYDP Manpower Cost, Department

$I_d$  = Total Annual Indirect FYDP Manpower Cost, Department

8. The total Annual FYDP manpower cost of each ship is computed as follows:

$$T_s = C_x + I_x$$

where:  $T_S$  = Total Annual FYDP Manpower cost, Ship

$C_X$  = Total Annual Direct FYDP Manpower Cost, Ship

$I_X$  = Total annual Indirect FYDP Manpower Cost,  
Ship

9. The FYDP manpower cost computation results for Civil Service personnel are shown in Tables A-87 through A-99.

10. The manpower FYDP cost of Navy Military detachment personnel was computed in the same manner used in the Navy military manning FYDP cost analysis. The manpower FYDP cost computation results for these personnel are shown in Tables A-100 through A-112.

11. Table A-113 provides a summary by ship type of the annual FYDP manpower cost for the Navy Civil Service manning option.

12. The economic cost of manpower represents the total cost to the Department of Defense of the manpower utilized to operate each representative support ship under study. These economic costs differ significantly from appropriation oriented (FYDP) costs in that they include accrued and deferred costs which are incurred by the U.S. Government.

13. The economic cost computations for Civil service personnel differ from the FYDP computations only in the manner in which retirement is computed.

The retirement factor for budget cost is:

$$.07 \sum_i^k B_i N_i$$

TABLE A-87

MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Stores      REPRESENTATIVE SHIP STUDIED AF-58      NUMBER OF SHIPS IN FLEET 1

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	1,275	1,318	1,275	1,318
ENGINE	883	913	883	913
STEWARD	442	454	442	454
PURSER	52	54	52	54
MEDICAL	22	23	22	23
ALL DEPARTMENTS	2,674	2,762	2,674	2,762

\* All costs shown in thousands of FY \$77

TABLE A-88  
MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Combat Stores REPRESENTATIVE SHIP STUDIED AFS-3 NUMBER OF SHIPS IN FLEET 7

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC. COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	1,472	1,521	10,304	10,647
ENGINE	948	982	6,636	6,874
STEWARD	557	573	3,899	4,011
PURSER	199	207	1,393	1,449
MEDICAL	22	23	154	161
ALL DEPARTMENTS	3,198	3,306	22,386	23,142

\* All costs shown in thousands of FY \$77

TABLE A-89

MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Replenishment OilerREPRESENTATIVE SHIP STUDIED AOR-4NUMBER OF SHIPS IN FLEET 7

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	1,263	1,304	8,841	9,121
ENGINE	1,104	1,138	7,728	7,966
STEWARD	502	515	3,514	3,605
PURSER	161	167	1,127	1,169
MEDICAL	24	25	168	175
ALL DEPARTMENTS	3,054	3,149	21,378	22,036

\* All costs shown in thousands of FY \$77

TABLE A-90  
MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Fast Combat Support

REPRESENTATIVE SHIP STUDIED A0E-3 NUMBER OF SHIPS IN FLEET 4

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	1,336	1,380	5,344	5,520
ENGINE	2,175	2,245	8,700	8,980
STEWARD	676	694	2,704	2,776
PURSER	160	166	640	664
MEDICAL	24	25	96	100
ALL DEPARTMENTS	4,371	4,510	17,484	18,040

\* All costs shown in thousands of FY \$77



TABLE A-91  
MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL - NAVY CIVIL SERVICE MANNING)

TYPE SHIP <u>Ammunition</u>		REPRESENTATIVE SHIP STUDIED <u>AE-28</u>			NUMBER OF SHIPS IN FLEET <u>13</u>	
DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET		
DECK	1,387	1,432	18,031	18,616		
ENGINE	918	949	11,934	12,337		
STEWARD	572	588	7,436	7,644		
PURSER	83	86	1,079	1,118		
MEDICAL						
ALL DEPARTMENTS	2,960	3,055	38,480	39,715		

\* All costs shown in thousands of FY \$77

TABLE A-92

MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Fleet OilerREPRESENTATIVE SHIP STUDIED A0-177NUMBER OF SHIPS IN FLEET 16

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	982	1,012	15,712	16,208
ENGINE	721	745	11,536	11,920
STEWARD	461	474	7,376	7,584
PURSER	175	182	2,800	2,912
MEDICAL	23	24	369	384
ALL DEPARTMENTS	2,362	2,438	37,792	39,008

\* All costs shown in thousands of FY \$77

TABLE A-93

MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Destroyer TenderREPRESENTATIVE SHIP STUDIED AD-37NUMBER OF SHIPS IN FLEET 9

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	656	680	5,904	6,120
ENGINE	686	712	6,174	6,408
STEWARD	1,624	1,672	14,616	15,057
PURSER	55	58	495	522
MEDICAL				
ALL DEPARTMENTS	3,021	3,122	27,189	28,107

\* All costs shown in thousands of FY \$77

TABLE A-94  
MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Submarine Tender  
REPRESENTATIVE SHIP STUDIED AS-36 NUMBER OF SHIPS IN FLEET 12

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	656	680	7,872	8,160
ENGINE	686	712	8,232	8,544
STEWARD	1,624	1,672	19,488	20,076
PURSER	55	58	660	696
MEDICAL				
ALL DEPARTMENTS	3,021	3,122	36,252	37,476

\* All costs shown in thousands of FY \$77

TABLE A-95

MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Heavy RepairREPRESENTATIVE SHIP STUDIED AR-6NUMBER OF SHIPS IN FLEET 4

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	637	660	2,548	2,640
ENGINE	665	691	2,660	2,764
STEWARD	1,622	1,670	6,488	6,680
PURSER	55	57	220	228
MEDICAL				
ALL DEPARTMENTS	2,979	3,078	11,916	12,312

\* All costs shown in thousands of FY \$77

TABLE A-96  
MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL - NAVY CIVIL SERVICE MANNING)

TYPE SHIP <u>Salvage</u>		REPRESENTATIVE SHIP STUDIED <u>ARS- 41</u>			NUMBER OF SHIPS IN FLEET <u>6</u>	
DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET		
DECK	361	373	2,166	2,238		
ENGINE	319	331	1,914	1,986		
STEWARD	130	133	780	798		
PURSER						
MEDICAL						
ALL DEPARTMENTS	810	837	4,860	5,022		

\* All costs shown in thousands of FY \$77



TABLE A-97

MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Salvage & RescueREPRESENTATIVE SHIP STUDIED ASR-22NUMBER OF SHIPS IN FLEET 6

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	517	535	3,102	3,210
ENGINE	694	717	4,164	4,308
STEWARD	271	279	1,626	1,674
PURSER	52	54	312	324
MEDICAL				
ALL DEPARTMENTS	1,534	1,585	9,204	9,516

\* All costs shown in thousands of FY \$77

TABLE A-98  
MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL - NAVY CIVIL SERVICE MANNING)

TYPE SHIP <u>Towing</u>		REPRESENTATIVE SHIP STUDIED <u>ATF-166</u>		NUMBER OF SHIPS IN FLEET <u>7</u>	
DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET	
DECK	318	327	2,226	2,289	
ENGINE	113	118	791	826	
STEWARD	105	108	735	756	
PURSER					
MEDICAL					
ALL DEPARTMENTS	536	553	3,752	3,871	

\* All costs shown in thousands of FY \$77

TABLE A-99  
MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Towing & Salvage REPRESENTATIVE SHIP STUDIED ATS-1 NUMBER OF SHIPS IN FLEET 3

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	377	390	1,131	1,170
ENGINE	334	345	1,002	1,038
STEWARD	139	143	417	429
PURSER				
MEDICAL				
ALL DEPARTMENTS	850	878	2,550	2,637

\* All costs shown in thousands of FY \$77

TABLE A-100

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Stores

REPRESENTATIVE SHIP STUDIED    AF-58			NUMBER OF SHIPS IN FLEET    1	
FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS	35	54	35	54
ADMINISTRATION	10	15	10	15
COMMUNICATIONS	128	183	128	183
SUPPLY	19	27	19	27
MEDICAL/DENTAL				
GUARD				
EXPLOSIVE ORD.				
DISPOSAL				
COMBAT INF. CENTER				
SALVAGE/RESCUE				
REPAIR				
STEWARD				
ALL	192	279	192	279

\* All costs shown in thousands of FY \$77

TABLE A-101

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT - NAVY CIVIL SERVICE MANNING)

TYPE SHIP <u>Combat Stores</u>		REPRESENTATIVE SHIP STUDIED <u>AFS-3</u>		NUMBER OF SHIPS IN FLEET <u>7</u>	
FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET	
OPERATIONS	35	54	245	378	
ADMINISTRATION	10	15	70	105	
COMMUNICATIONS	239	337	1,673	2,359	
SUPPLY	176	251	1,232	1,757	
MEDICAL/DENTAL					
GUARD					
EXPLOSIVE ORD. DISPOSAL					
COMBAT INF. CENTER	32	45	224	315	
SALVAGE/RESCUE					
REPAIR					
STEWARD					
ALL	492	702	3,444	4,914	

\* All costs shown in thousands of FY \$77

TABLE A-102

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Replenishment OilerREPRESENTATIVE SHIP STUDIED AOR-4 NUMBER OF SHIPS IN FLEET 7

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS	35	54	245	378
ADMINISTRATION	10	15	70	105
COMMUNICATIONS	239	337	1,673	2,359
SUPPLY	19	27	133	189
MEDICAL/DENTAL				
GUARD				
EXPLOSIVE ORD. DISPOSAL				
COMBAT INF. CENTER				
SALVAGE/RESCUE				
REPAIR				
STEWARD				
ALL	303	433	2,121	3,031

\* All costs shown in thousands of FY \$77



TABLE A-103

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Fast Combat Support

REPRESENTATIVE SHIP STUDIED <u>AOE-3</u>		NUMBER OF SHIPS IN FLEET <u>4</u>		
FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS	35	54	140	216
ADMINISTRATION	10	15	40	60
COMMUNICATIONS	239	337	956	1,348
SUPPLY				
MEDICAL/DENTAL				
GUARD	109	166	436	664
EXPLOSIVE ORD.				
DISPOSAL	38	53	152	212
COMBAT INF. CENTER				
SALVAGE/RESCUE				
REPAIR				
STEWARD				
ALL	431	625	1,724	2,500

\* All costs shown in thousands of FY \$77

TABLE A-104

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT - NAVY CIVIL SERVICE MANNING)

TYPE SHIP AmmunitionREPRESENTATIVE SHIP STUDIED AE-28 NUMBER OF SHIPS IN FLEET 13

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS	23	35	299	455
ADMINISTRATION	23	30	299	390
COMMUNICATIONS	131	185	1,703	2,405
SUPPLY	13	18	169	234
MEDICAL/DENTAL	13	18	169	234
GUARD	98	152	1,274	1,976
EXPLOSIVE ORD.				
DISPOSAL	17	24	221	312
COMBAT INF. CENTER				
SALVAGE/RESCUE				
REPAIR				
STEWARD				
ALL	318	462	4,134	6,006

\* All costs shown in thousands of FY \$77

TABLE A-105

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT - NAVY CIVIL SERVICE MANNING)

TYPE SHIP	Fleet Oiler	REPRESENTATIVE SHIP STUDIED	A0-177	NUMBER OF SHIPS IN FLEET	16
FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET	
OPERATIONS	39	60	624	960	
ADMINISTRATION	13	18	208	288	
COMMUNICATIONS	163	231	2,608	3,696	
SUPPLY					
MEDICAL/DENTAL					
GUARD					
EXPLOSIVE ORD. DISPOSAL					
COMBAT INF. CENTER					
SALVAGE/RESCUE					
REPAIR					
STEWARD					
ALL	215	309	3,440	4,944	

\* All costs shown in thousands of FY \$77

TABLE A-106

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Destroyer TenderREPRESENTATIVE SHIP STUDIED AD-37NUMBER OF SHIPS IN FLEET 9

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS				
ADMINISTRATION				
COMMUNICATIONS	272	392	2,448	3,528
SUPPLY	1,126	1,617	10,134	14,553
MEDICAL/DENTAL	364	539	3,276	4,851
GUARD				
EXPLOSIVE ORD.				
DISPOSAL				
COMBAT INF. CENTER				
SALVAGE/RESCUE				
REPAIR	5,396	7,686	48,564	69,174
STEWARD				
ALL	7,158	10,234	64,422	92,106

\* All costs shown in thousands of FY \$77

TABLE A-107

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT - NAVY CIVIL SERVICE MANNING)

TYPE SHIP <u>Submarine Tender</u>		REPRESENTATIVE SHIP STUDIED <u>AS-36</u>		NUMBER OF SHIPS IN FLEET <u>12</u>	
FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET	
OPERATIONS					
ADMINISTRATION					
COMMUNICATIONS	270	386	3,240	4,632	
SUPPLY	708	1,043	8,496	12,516	
MEDICAL/DENTAL	383	575	4,596	6,900	
GUARD					
EXPLOSIVE ORD.					
DISPOSAL					
COMBAT INF. CENTER					
SALVAGE/RESCUE					
REPAIR	7,043	10,063	84,516	120,756	
STEWARD					
ALL	8,404	12,067	100,848	144,804	

\* All costs shown in thousands of FY \$77

TABLE A-108

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Heavy RepairREPRESENTATIVE SHIP STUDIED AR-6 NUMBER OF SHIPS IN FLEET 4

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS				
ADMINISTRATION				
COMMUNICATIONS	265	379	1,060	1,516
SUPPLY	573	833	2,292	3,332
MEDICAL/DENTAL	225	335	900	1,340
GUARD				
EXPLOSIVE ORD. DISPOSAL				
COMBAT INF. CENTER				
SALVAGE/RESCUE				
REPAIR	2,349	3,577	9,396	14,308
STEWARD				
ALL	3,412	5,124	13,648	20,496

\* All costs shown in thousands of FY \$77



TABLE A-109

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT - NAVY CIVIL SERVICE MANNING)

TYPE SHIP SalvageREPRESENTATIVE SHIP STUDIED ARS-41NUMBER OF SHIPS IN FLEET 6

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS				
ADMINISTRATION				
COMMUNICATIONS	67	96	402	576
SUPPLY				
MEDICAL/DENTAL				
GUARD				
EXPLOSIVE ORD. DISPOSAL				
COMBAT INF. CENTER				
SALVAGE/RESCUE				
REPAIR				
STEWARD				
ALL	67	96	402	576

\* All costs shown in thousands of FY \$77

TABLE A-110

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Salvage & RescueREPRESENTATIVE SHIP STUDIED ASR-22NUMBER OF SHIPS IN FLEET 6

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS	27	45	162	270
ADMINISTRATION	10	15	60	90
COMMUNICATIONS	132	184	792	1,104
SUPPLY				
MEDICAL/DENTAL	33	47	198	282
GUARD				
EXPLOSIVE ORD. DISPOSAL				
COMBAT INF. CENTER				
SALVAGE/RESCUE	104	155	624	930
REPAIR				
STEWARD				
ALL	306	446	1,836	2,676

\* All costs shown in thousands of FY \$77

TABLE A-111

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT - NAVY CIVIL SERVICE MANNING)

TYPE SHIP <u>Towing</u>		REPRESENTATIVE SHIP STUDIED <u>ATF-166</u>		NUMBER OF SHIPS IN FLEET <u>7</u>	
FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET	
OPERATIONS					
ADMINISTRATION					
COMMUNICATIONS	42	59	294	413	
SUPPLY					
MEDICAL/DENTAL					
GUARD					
EXPLOSIVE ORD. DISPOSAL					
COMBAT INF. CENTER					
SALVAGE/RESCUE					
REPAIR					
STEWARD					
ALL	42	59	294	413	

\* All costs shown in thousands of FY \$77

TABLE A-112

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT - NAVY CIVIL SERVICE MANNING)

TYPE SHIP Towing & SalvageREPRESENTATIVE SHIP STUDIED ATS-1NUMBER OF SHIPS IN FLEET 3

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS				
ADMINISTRATION				
COMMUNICATIONS	67	96	201	288
SUPPLY				
MEDICAL/DENTAL				
GUARD				
EXPLOSIVE ORD. DISPOSAL				
COMBAT INF. CENTER				
SALVAGE/RESCUE	88	130	264	390
REPAIR				
STEWARD				
ALL	155	226	465	678

\* All costs shown in thousands of FY \$77

TAB B

TABLE A-113

MANPOWER COST ANALYSIS SUMMARY\*  
(TOTAL SHIP ANNUAL MANPOWER COST--NAVY CIVIL SERVICE MANNING)

SHIP TYPE	FYDP COST \$			ECONOMIC COST \$		
	CIVIL SERVICE PERSONNEL	NAVY MILITARY DETACHMENT	TOTAL	CIVIL SERVICE PERSONNEL	NAVY MILITARY DETACHMENT	TOTAL
AF	2,674	192	2,866	2,762	279	3,041
AFS	3,198	492	3,690	3,306	702	4,008
AOR	3,054	303	3,357	3,149	433	3,582
AOE	4,371	431	4,802	4,510	625	5,135
AE	2,960	318	3,278	3,055	462	3,517
AO	2,362	215	2,577	2,438	309	2,747
AD	3,021	7,158	10,179	3,122	10,234	13,356
AS	3,021	8,404	11,425	3,122	12,067	15,189
AR	2,979	3,412	6,391	3,078	5,124	8,202
ARS	810	67	877	837	96	933
ASR	1,534	306	1,840	1,585	446	2,031
ATF	536	42	578	553	59	612
ATS	850	155	1,005	878	226	1,104

\* All costs shown in thousands of FY \$77

the retirement factor used for economic cost computation is:

$$.141 \sum_{i=1}^k B_i N_i$$

The retirement computation rate of 14.1% was directed by OMB Circular A-76 revised 13 June 1977, and reflects the actual cost of retirement incurred by the government for these personnel rather than the budgeted cost represented by the 7.0% rate.

14. All other cost computations are identical to those used to determine the budget cost of civil service personnel. The result of the manpower economic cost computations are shown in Tables A-87 through A-99.

15. The economic manpower cost of Navy Military Detachment personnel was computed in the same manner used in the Navy Military Manning economic cost analysis. The economic manpower cost computation results for these personnel are shown in Tables A-100 through A-112.

16. The total cost of manpower required for the operation of fleet support ships via the Navy Civil Service manning alternative (Civil Service personnel cost plus Navy Military Detachment cost) is summarized in Table A-113.

E. MANPOWER COST ANALYSES--COMMERCIAL CONTRACT MANNING

Tables A-114 through A-139 summarize MARAD's cost estimates for Commercial Contract manning of fleet support ships. Military detachment manning and costs were supplied by the Study Group.



TABLE A-114  
MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP <u>Stores</u>		REPRESENTATIVE SHIP STUDIED <u>AF-58</u>		NUMBER OF SHIPS IN FLEET <u>1</u>	
DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET	
DECK	1,413	1,413	1,413	1,413	
ENGINE	1,133	1,133	1,133	1,133	
STEWARD	507	507	507	507	
PURSER	38	38	38	38	
MEDICAL	0	0	0	0	
ALL DEPARTMENTS	3,091	3,091	3,091	3,091	

\* All costs shown in thousands of FY \$77

TABLE A-115  
MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP	Combat Stores	REPRESENTATIVE SHIP STUDIED	AFS-3	NUMBER OF SHIPS IN FLEET	7
DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET	
DECK	2,636	2,636	18,452	18,452	
ENGINE	1,298	1,298	9,086	9,086	
STEWARD	584	584	4,088	4,088	
PURSER	38	38	266	266	
MEDICAL	0	0	0	0	
ALL DEPARTMENTS	4,556	4,556	31,892	31,892	

\* All costs shown in thousands of FY \$77

TABLE A-116  
MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Replenishment Oiler      NUMBER OF SHIPS IN FLEET 7  
REPRESENTATIVE SHIP STUDIED AOR-4

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	2,602	2,602	18,214	18,214
ENGINE	1,747	1,747	12,229	12,229
STEWARD	603	603	4,221	4,221
PURSER	91	91	637	637
MEDICAL	0	0	0	0
ALL DEPARTMENTS	5,043	5,043	35,301	35,301

\* All costs shown in thousands of FY \$77

TABLE A-117  
MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP <u>Fast Combat Support</u>		REPRESENTATIVE SHIP STUDIED <u>AOE-3</u>		NUMBER OF SHIPS IN FLEET <u>4</u>	
DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET	
DECK	3,063	3,063	12,252	12,252	
ENGINE	2,143	2,143	8,572	8,572	
STEWARD	661	661	2,644	2,644	
PURSER	91	91	364	364	
MEDICAL	0	0	0	0	
ALL DEPARTMENTS	5,958	5,958	23,832	23,832	

\* All costs shown in thousands of FY \$77

TABLE A-118

MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Ammunition

REPRESENTATIVE SHIP STUDIED AE-28 NUMBER OF SHIPS IN FLEET 13

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	2,100	2,100	27,300	27,300
ENGINE	800	800	11,479	11,479
STEWARD	574	574	7,462	7,462
PURSER	0	0	0	0
MEDICAL	0	0	0	0
ALL DEPARTMENTS	3,474	3,474	46,241	46,241

\* All costs shown in thousands of FY \$77

TABLE A-119  
MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Fleet Oiler

REPRESENTATIVE SHIP STUDIED A0-177

NUMBER OF SHIPS IN FLEET 16

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	1,307	1,307	20,912	20,912
ENGINE	1,103	1,103	17,648	17,648
STEWARD	527	527	8,432	8,432
PURSER	46	46	736	736
MEDICAL	0	0	0	0
ALL DEPARTMENTS	2,983	2,983	47,728	47,728

\* All costs shown in thousands of FY \$77



TABLE A-120

MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Destroyer TenderREPRESENTATIVE SHIP STUDIED AD-37NUMBER OF SHIPS IN FLEET 9

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	1,357	1,357	12,213	12,213
ENGINE	800	800	7,200	7,200
STEWARD	1,418	1,418	12,762	12,762
PURSER	38	38	342	342
MEDICAL	0	0	0	0
ALL DEPARTMENTS	3,613	3,613	32,517	32,517

\* All costs shown in thousands of FY \$77

TABLE A-121

MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Submarine TenderREPRESENTATIVE SHIP STUDIED AS-36NUMBER OF SHIPS IN FLEET 12

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	1,357	1,357	16,284	16,284
ENGINE	800	800	9,600	9,600
STEWARD	1,418	1,418	17,016	17,016
PURSER	38	38	456	456
MEDICAL	0	0	0	0
ALL DEPARTMENTS	3,613	3,613	43,356	43,365

\* All costs shown in thousands of FY \$77

TABLE A-122

MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL--COMMERCIAL CONTRACT MANNING)TYPE SHIP Heavy Repair ShipREPRESENTATIVE SHIP STUDIED AR-6NUMBER OF SHIPS IN FLEET 4

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	1,338	1,338	5,352	5,352
ENGINE	1,177	1,177	4,708	4,708
STEWARD	1,410	1,410	5,640	5,640
PURSER	38	38	152	152
MEDICAL	0	0	0	0
ALL DEPARTMENTS	3,963	3,963	15,852	15,852

\* All costs shown in thousands of FY \$77

TABLE A-123  
MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Salvage Ship

REPRESENTATIVE SHIP STUDIED ARS-41

NUMBER OF SHIPS IN FLEET 6

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	478	478	2,868	2,868
ENGINE	355	355	2,130	2,130
STEWARD	128	128	768	768
PURSER	0	0	0	0
MEDICAL	0	0	0	0
ALL DEPARTMENTS	961	961	5,766	5,766

\* All costs shown in thousands of FY \$77

TABLE A-124

MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Salvage & RescueREPRESENTATIVE SHIP STUDIED ASR-22NUMBER OF SHIPS IN FLEET 6

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	564	564	3,384	3,384
ENGINE	877	877	5,262	5,262
STEWARD	221	221	1,326	1,326
PURSER	0	0	0	0
MEDICAL	0	0	0	0
ALL DEPARTMENTS	1,662	1,662	9,972	9,972

\* All costs shown in thousands of FY \$77

TABLE A-125  
MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Towing

REPRESENTATIVE SHIP STUDIED ATF-166

NUMBER OF SHIPS IN FLEET 7

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	570	570	3,990	3,990
ENGINE	339	339	2,373	2,373
STEWARD	103	103	721	721
PURSER	0	0	0	0
MEDICAL	0	0	0	0
ALL DEPARTMENTS	1,012	1,012	7,084	7,084

\* All costs shown in thousands of FY \$77



TABLE A-126

MANPOWER COST ANALYSIS SUMMARY \*  
(CIVILIAN PERSONNEL--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Towing & SalvageREPRESENTATIVE SHIP STUDIED ATS-1NUMBER OF SHIPS IN FLEET 3

DEPARTMENT	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
DECK	570	570	1,710	1,710
ENGINE	343	343	1,029	1,029
STEWARD	106	106	318	318
PURSER	0	0	0	0
MEDICAL	0	0	0	0
ALL DEPARTMENTS	1,019	1,019	3,057	3,057

\* All costs shown in thousands of FY \$77

TABLE A-127

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT -- COMMERCIAL CONTRACT MANNING)

TYPE SHIP Stores		REPRESENTATIVE SHIP STUDIED AF-58		NUMBER OF SHIPS IN FLEET 1	
FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET	
OPERATIONS	37	57	37	57	
ADMINISTRATION	10	15	10	15	
COMMUNICATIONS	160	231	160	231	
SUPPLY	89	133	89	133	
MEDICAL/DENTAL					
GUARD					
EXPLOSIVE ORD.					
DISPOSAL					
COMBAT INF. CENTER					
SALVAGE/RESCUE					
REPAIR					
STEWARD					
ALL	296	436	296	436	

\* All costs shown in thousands of FY \$77

TABLE A-128

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Combat StoresREPRESENTATIVE SHIP STUDIED AFS-3 NUMBER OF SHIPS IN FLEET 7

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS	42	65	294	455
ADMINISTRATION	13	18	91	126
COMMUNICATIONS	225	325	1,575	2,275
SUPPLY	260	379	1,820	2,653
MEDICAL/DENTAL	23	33	161	231
GUARD				
EXPLOSIVE ORD. DISPOSAL				
COMBAT INF. CENTER	33	47	231	329
SALVAGE/RESCUE				
REPAIR				
STEWARD				
ALL	596	867	4,172	6,069

\* All costs shown in thousands of FY \$77

TABLE A-129

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT -- COMMERCIAL CONTRACT MANNING)

TYPE SHIP Replenishment Oiler

REPRESENTATIVE SHIP STUDIED <u>AOR-4</u>				NUMBER OF SHIPS IN FLEET <u>7</u>	
FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET	
OPERATIONS	37	57	259	399	
ADMINISTRATION	10	15	70	105	
COMMUNICATIONS	225	325	1,565	2,275	
SUPPLY	57	87	399	609	
MEDICAL/DENTAL	23	33	161	231	
GUARD					
EXPLOSIVE ORD.					
DISPOSAL					
COMBAT INF. CENTER					
SALVAGE/RESCUE					
REPAIR					
STEWARD					
ALL	352	517	2,454	3,619	

\* All costs shown in thousands of FY \$77

TABLE A-130

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT-- COMMERCIAL CONTRACT MANNING)

TYPE SHIP Fast Combat Support
 REPRESENTATIVE SHIP STUDIED AOE-3 NUMBER OF SHIPS IN FLEET 4

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS	40	62	160	248
ADMINISTRATION	10	15	40	60
COMMUNICATIONS	225	325	900	1,300
SUPPLY	57	87	228	348
MEDICAL/DENTAL	23	33	92	132
GUARD	130	195	520	780
EXPLOSIVE ORD.				
DISPOSAL	21	29	84	116
COMBAT INF. CENTER	33	47	132	188
SALVAGE/RESCUE				
REPAIR				
STEWARD				
ALL	539	793	2,156	3,172

\* All costs shown in thousands of FY \$77



TABLE A-131

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT -- COMMERCIAL CONTRACT MANNING)

TYPE SHIP <u>Ammunition</u>		REPRESENTATIVE SHIP STUDIED <u>AE-28</u>			NUMBER OF SHIPS IN FLEET <u>13</u>	
FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET		
OPERATIONS	39	60	507	780		
ADMINISTRATION	10	15	130	195		
COMMUNICATIONS	147	213	1,911	2,769		
SUPPLY	131	192	1,703	2,496		
MEDICAL/DENTAL	23	33	299	429		
GUARD	86	132	1,118	1,716		
EXPLOSIVE ORD. DISPOSAL	19	27	247	351		
COMBAT INF. CENTER						
SALVAGE/RESCUE						
REPAIR						
STEWARD						
ALL	455	672	5,915	8,736		

\* All costs shown in thousands of FY \$77



TABLE A-132

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT -- COMMERCIAL CONTRACT MANNING)

TYPE SHIP Fleet OilerREPRESENTATIVE SHIP STUDIED AO-177 NUMBER OF SHIPS IN FLEET 16

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS	37	57	592	912
ADMINISTRATION	10	15	160	240
COMMUNICATIONS	132	192	2,112	3,072
SUPPLY	30	42	480	672
MEDICAL/DENTAL				
GUARD				
EXPLOSIVE ORD.				
DISPOSAL				
COMBAT INF. CENTER				
SALVAGE/RESCUE				
REPAIR				
STEWARD				
ALL	209	306	3,344	4,896

\* All costs shown in thousands of FY \$77

TABLE A-133

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT -- COMMERCIAL CONTRACT MANNING)

TYPE SHIP Destroyer TenderREPRESENTATIVE SHIP STUDIED AD-37NUMBER OF SHIPS IN FLEET 9

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS				
ADMINISTRATION				
COMMUNICATIONS	272	392	2,448	3,528
SUPPLY	1,126	1,617	10,134	14,553
MEDICAL/DENTAL	364	539	3,276	4,851
GUARD				
EXPLOSIVE ORD. DISPOSAL				
COMBAT INF. CENTER				
SALVAGE/RESCUE				
REPAIR	5,396	7,685	48,564	69,165
STENARD				
ALL	7,158	10,233	64,422	92,097

\* All costs shown in thousands of FY \$77

TABLE A-134

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Submarine Tender
 REPRESENTATIVE SHIP STUDIED AS-36 NUMBER OF SHIPS IN FLEET 12

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS				
ADMINISTRATION				
COMMUNICATIONS	270	386	3,240	4,632
SUPPLY	708	1,043	8,496	12,516
MEDICAL/DENTAL	383	575	4,596	6,900
GUARD				
EXPLOSIVE ORD.				
DISPOSAL				
COMBAT INF. CENTER				
SALVAGE/RESCUE				
REPAIR	7,043	10,063	84,516	120,756
STEWARD				
ALL	8,404	12,067	100,848	144,804

\* All costs shown in thousands of FY \$77

TABLE A-135

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT-- COMMERCIAL CONTRACT MANNING)

TYPE SHIP Heavy Repair

REPRESENTATIVE SHIP STUDIED		AR-6		NUMBER OF SHIPS IN FLEET		4
FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET		
OPERATIONS						
ADMINISTRATION						
COMMUNICATIONS	265	379	1,060	1,516		
SUPPLY	573	833	2,292	3,332		
MEDICAL/DENTAL	225	335	900	1,340		
GUARD						
EXPLOSIVE ORD.						
DISPOSAL						
COMBAT INF. CENTER						
SALVAGE/RESCUE						
REPAIR	2,349	3,577	9,396	14,308		
STEWARD						
ALL	3,412	5,124	13,648	20,496		

\* All costs shown in thousands of FY \$77

TABLE A-136

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT-- COMMERCIAL CONTRACT MANNING)

TYPE SHIP Salvage Ship

REPRESENTATIVE SHIP STUDIED		ARS-41		NUMBER OF SHIPS IN FLEET		6
FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET		
OPERATIONS						
ADMINISTRATION						
COMMUNICATIONS	86	123	516	738		
SUPPLY						
MEDICAL/DENTAL						
GUARD						
EXPLOSIVE ORG. DISPOSAL						
COMBAT INF. CENTER						
SALVAGE/RESCUE						
REPAIR						
STEWARD						
ALL	86	123	516	738		

\* All costs shown in thousands of FY \$77

TABLE A-137

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT--COMMERCIAL CONTRACT MANNING)

TYPE SHIP Salvage & RescueREPRESENTATIVE SHIP STUDIED ASR-22 NUMBER OF SHIPS IN FLEET 6

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS	29	49	174	294
ADMINISTRATION	10	15	60	90
COMMUNICATIONS	170	239	1,020	1,434
SUPPLY				
MEDICAL/DENTAL	32	45	192	270
GUARD				
EXPLOSIVE ORD.				
DISPOSAL				
COMBAT INF. CENTER				
SALVAGE/RESCUE	113	167	678	1,002
REPAIR				
STEWARD				
ALL	354	515	2,124	3,090

\* All costs shown in thousands of FY \$77



TABLE A-138

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT -- COMMERCIAL CONTRACT MANNING)

TYPE SHIP TowingREPRESENTATIVE SHIP STUDIED ATF-166 NUMBER OF SHIPS IN FLEET 7

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS				
ADMINISTRATION				
COMMUNICATIONS	106	151	742	1,057
SUPPLY				
MEDICAL/DENTAL				
GUARD				
EXPLOSIVE ORD.				
DISPOSAL				
COMBAT INF. CENTER				
SALVAGE/RESCUE				
REPAIR				
STEWARD				
ALL	106	151	742	1,057

\* All costs shown in thousands of FY \$77

TABLE A-139

MANPOWER COST ANALYSIS SUMMARY \*  
(NAVY MILITARY DETACHMENT -- COMMERCIAL CONTRACT MANNING)

TYPE SHIP Towing & SalvageREPRESENTATIVE SHIP STUDIED ATS-1NUMBER OF SHIPS IN FLEET 3

FUNCTION	ANNUAL FYDP COST, SHIP	ANNUAL ECONOMIC COST, SHIP	ANNUAL FYDP COST, FLEET	ANNUAL ECONOMIC COST, FLEET
OPERATIONS				
ADMINISTRATION				
COMMUNICATIONS	80	114	240	342
SUPPLY				
MEDICAL/DENTAL				
GUARD				
EXPLOSIVE ORD.				
DISPOSAL				
COMBAT INF. CENTER				
SALVAGE/RESCUE	95	142	285	426
REPAIR				
STEWARD				
ALL	175	256	525	768

\* All costs shown in thousands of FY \$77



## APPENDIX B

### TOTAL COST ANALYSIS

#### A. INTRODUCTION

1. A comprehensive cost analysis was conducted for each of three alternative manning policies: Navy Military, Navy Civil Service, and Commercial Contract. Both Five Year Defense Plan (FYDP) profiles and thirty year life cycle economic projections were developed.

2. The FYDP cost analysis considered all significant cost elements except new ship construction, addressed each of thirteen types of ships, and was conducted in escalated current year dollars. The economic study omitted all cost elements which did not vary with the manning alternative. These were the Ship Construction, Navy (SCN) cost per ship, the Base Operating Support (BOS) (O&MN) cost per ship year and the Fleet Modernization Program (FMP) Installation cost per ship. It included 108 ships. These were the existing ship hulls and their applicable replacements over a 30 year period. The economic analyses used constant 1977 fiscal year dollars. The economic cost to the U.S. Government and to the Department of Defense were estimated and the estimates were generated in both discounted and undiscounted dollars using a 10% discount rate.

3. The requisite operating cost data for the selected ship or ship type were extracted from the July 1976

Program Factors Manual<sup>1/</sup> to represent the specific class. The classes were selected to be typical of the ships of the present and near-future fleet and are presented in Table B-1.

B. FYDP COST ANALYSIS

The costs of operating and maintaining, and reconfiguring (where necessary) relevant ships (i.e., those considered as candidates for civilian manning) were projected for the fiscal years 1979 through 1983, and the cost for each year were adjusted in accordance with the rules prescribed in Program Objective Memorandum (POM) 79-15<sup>2/</sup>. In this analysis all relevant ships, including those presently manned by civilian crews, were assumed to be Navy manned for cost estimation purposes. All cost to the Navy were included in order to assess the impact on the FYDP of each manning alternative. Further, all cost estimates are shown in current year dollars (the year in which the corresponding funds are to be budgeted). Simple escalation factors provided by POM 79-15 for POL and other operating expenses were used to adjust individual cost elements. These cost estimates were aggregated to budget appropriation accounts. Then, the escalation factors, weighted by the

---

<sup>1/</sup> OPNAV-90P-02, Navy Program Factors Manual, Department of the Navy, July 1976

<sup>2/</sup> Office of the Chief of Naval Operations, Memorandum No. POM 79-15, Department of the Navy, January 6, 1977

TABLE B-1  
REPRESENTATIVE SHIP CLASSES

TYPE	REPRESENTATIVE HULL	CLASS
AF	AF-58	AF-58
AFS	AFS-3	AFS-1
AOR	AOR-4	AOR-1
AOE	AOE-3	AOE-1
AE	AE-28	AE-26
AO	AO-177	AO-177
AD	AD-37	AD-37
AS	AS-36	AS-36
AR	AR-6	AR-5
ARS	ARS-41	ARS-38
ASR	ASR-22	ASR-21
ATF	ATF-166	ATF-166
ATS	ATS-1	ATS-1



outlay distributions, were applied for each account in each year to yield budgetary estimates for the Navy portions of the FYDP.

1. Navy Military Manning

a. The following paragraphs describe the methodology used to estimate each FYDP appropriation account for the Navy military manning alternative.

b. The annual direct personnel cost associated with ship operations was estimated by applying the FY-77 Military Standard Composite Rates to the manpower estimates by grade. These rates reflect costs to the Navy only. For consistency with Navy Civil Service and Commercial Contract manning estimates, the assumption was made that the Navy will man its ships at full SMD (Ship Manning Document) levels by rate and rating by FY 79.

c. The Navy Program Factors Manual utilizes enlisted personnel pay rates as adjusted from a weighted average to reflect actual skill and pay grade composition of each ship class for enlisted personnel. This distinction is not, however, applied to officers. The officer pay rate is a weighted average rate across all Navy activities, and thus not necessarily applicable to support ships. A comparison between direct personnel costs computed using the composite rate structure and using the July 1976 Navy Program Factor rates is presented for each ship type in Table B-2. For completeness, the unadjusted direct personnel cost estimate

TABLE B-2  
ANNUAL DIRECT PERSONNEL COST COMPARISON  
(COSTS IN THOUSANDS FY 77 DOLLARS)

SHIP TYPE \ SOURCE	NARM <sup>1</sup>	COMPOSITE <sup>2</sup>	NARM <sup>3</sup>
AF	2177	2409	2259
AFS	3877	4282	3954
AOR	3580	3960	3878
AOE	4826	5305	5222
AE	3266	3594	3284
AO	1603	1837	3113
AD	12194	11446	12450
AS	12365	11879	12489
AR	7241	6808	8119
ARS	1175	1049	1037
ASR	2253	2056	2020
ATF	972	497	757
ATS	1443	1317	1079

<sup>1</sup>These amounts reflect manning levels shown in available SMDs, costed using NARM pay factors.

<sup>2</sup>Rates used are Composite Standard Military Rates effective 1 Oct 76.

<sup>3</sup>These amounts are from NARM Summary Factor Book in Then Year Dollars, enclosure 5, POM 79-15

provided by the NARM Five Year Projection (enclosure 5, POM 79-15) based on the NARM manpower projection is also presented. The 1976 NARM direct MPN cost estimate was adjusted to reflect manning levels contained in the Ship Manning Documents as opposed to actual manning levels which could vary daily. The equation used to compute direct personnel in this manner is presented in Figure B-1.

d. Based on the comparison of the three possible manpower costs, the composite rate approach reflects most closely the real cost of manpower to the Navy. The composite rate is not a weighted rate across support ships, but reflects the actual SMD manning by pay grades; i.e., 9 enlisted, 6 officer, and 4 warrant grades. It should be borne in mind that the NARM cost factors are developed for planning and programming purposes, whereas the analysis required by this study will be used for trade-off purposes and thus needs to reflect real costs in more detail. The cost estimate of indirect personnel was obtained from the Program Factors for each representative ship class selected. In accordance with POM 79-15, all personnel costs were estimated in constant FY dollars.

e. The operating scenario for each ship class was projected as follows. A representative ship in each class was selected from the April 1, 1976 Atlantic Fleet Daily Status annual recap and its cumulative average number of

NARM Normalized Direct MPN =

$$\frac{M_n - (21427 * O_n)}{E_n} * E_s + (21427 * O_s),$$

where:

$M_n$  = Total Direct MPN per ship-year from 1976  
Program Factors

$O_n$  = Officer Allowance from 1976 Program Factors

$E_n$  = Enlisted Allowance from 1976 Program Factors

$O_s$  = Officer Strength from SMD

$E_s$  = Enlisted Strength from SMD

21427 = Officer pay rate used in 1976 Program Factors

Figure B-1. NARM Normalized MPN Equation.

days at sea and in port per year were computed.<sup>1/</sup> The ATS ship was in port an atypical portion of the reporting period. Therefore, an ATF scenario was used as a proxy for that of the ATS class. The AF/TAF class of ships is entirely manned by civilian crews and, hence, the scenario reflected in the Program Factors (days at sea, days in port) was used as representative of the hypothetical Navy manned AF type ships. This information is presented in Table B-3.

f. Fuel costs were estimated as follows: The daily underway fuel cost and the daily fuel cost, not underway, were computed for each ship class from data provided in the Program Factors. The scenario described in Table B-3 was used to weight these two fuel cost components to obtain an estimate of annual fuel cost for each ship class.

g. The remaining cost of O&MN was estimated by summing the total Direct O&MN and total Indirect Operate O&MN cost factors and adjusting for the difference between fuel cost corresponding to the projected scenario and that included in the ship operations O&MN factor. The economic escalation factor of 6.7% provided in POM 79-15 was used to adjust FY 77 dollars to the FY 78 base year for POL and O&MN purchases. Outlay/escalation factors from POM 79-15 were applied to obtain annual FYDP estimates from FY 79 through FY 83.

---

<sup>1/</sup> OPNAV Code 642, Atlantic & Mediterranean Fleet Daily Status, Department of the Navy, April 1, 1976

Table B-3  
 REPRESENTATIVE OPERATING PROFILE  
 (Annual Basis)

SHIP TYPE	AT SEA DAYS <sup>1/</sup>	IN PORT DAYS
<u>UNREP</u>		
TAF	140	225
AF	123	242
AFS	135	230
AOR	121	244
AOE	77	288
AE	80	285
TAO	181	184
AO	154	211
<u>REPAIR</u>		
AD	43	322
AS	18	347
AR	46	319
<u>TOWING/SALVAGE AND RESCUE</u>		
ARS	178	187
ASR	85	280
TATF	246	119
ATS/ATF	161	204

<sup>1/</sup>The data shown is based on a one (1) year representative deployment of Atlantic Fleet ships, including 6 months assignment to COMSIXFLT in the Mediterranean Theater. The data represents peacetime requirements and not capabilities. Navy Civil Service manned ships' detachment patterns in the Pacific are usually for more extended periods than in the Atlantic Ocean. The use of Atlantic fleet scenarios is therefore the more conservative case.



h. The annual cost of the OPN account was estimated as the Direct OPN cost category of the Program Factors for each representative ship class. The OPN outlay/escalation factors provided in POM 79-15 for base year FY 77 were applied to obtain annual FYDP estimates for FY 79 through FY 83.

i. The projection of active fleet ships by year was obtained from the March 2, 1977 FYDP update.<sup>1/</sup> This also provided the present Navy plans for budgeting of new ship construction for FY 79 through FY 83. The unit procurement cost of each ship for which procurement funds are to be budgeted in the FY 79 FYDP time period were provided by NAVSEA.<sup>2/</sup> The unit costs were escalated to FY 77 dollars by the escalation factor. The SCN is shown in the upper portion of the following tables for information. Since the cost of new construction is constant across manning alternatives, it is not included in the FYDP cost estimates.

j. The mathematical formula utilized to estimate the cost elements (in dollars per ship) of each FYDP appropriation accounts, by ship type are as follows. All cost extracted from the Navy Program Factors are in FY 77 dollars.

<sup>1/</sup> Department of the Navy, Five Year Defense Program, March 2, 1977

<sup>2/</sup> PMS-383, Auxiliary Ship Acquisition Program Manager, Naval Sea Systems Command

### MPN

$$MPN_{Ti} = (MPN_D + MPN_I) * Q_i$$

where:  $MPN_{Ti}$  = Manpower total cost in year i

$MPN_D$  = Direct Manpower as computed in FY 77  
dollars

$MPN_I$  = Indirect Manpower cost from Program Factors

$Q_i$  = Number of ships operating in year i

### O&MN

$$OMN_{Ti} = (OMN_D - P_n + OMN_I) * E_i + (P_c * F_i) * Q_i$$

where:  $OMN_{Ti}$  = Total O&MN cost in year i

$OMN_D$  = Direct OMN from Program Factors

$P_n$  = Annual fuel cost from Program Factors

$P_c$  = Annual fuel costs as computed for  
operating scenario

$OMN_I$  = Indirect OMN from Program Factors

$E_i$  = Escalation factor for OMN Purchases,  
year i

$F_i$  = Escalation factor for OMN POL, year i

$Q_i$  = Number of ships operating in year i

### OPN

$$OPN_{Ti} = (OPN_D * G_i) * Q_i$$

where:  $OPN_{Ti}$  = Total OPN, year i

$OPN_D$  = Direct OPN from Program Factors

$G_i$  = Escalation factor for OPN, year i

$Q_i$  = Number of ships operating in year i

Cost estimates for the total fleet of a particular ship type are derived by multiplying each appropriation account by the number of ships operating each year.

k. The budget estimates for the FYDP resulting from the analysis are provided in Tables B-4 through B-16. They are displayed as a computer printout generated by a program developed for this purpose.

## 2. Navy Civil Service Manning

a. These FYDP estimates for Civil Service Manning are primarily based on data supplied by the Military Sealift Command (MSC) and additional factors extracted from the Navy Program Factors Manual. This is an analysis of the Navy Civil Service crew operation of the ships under study. Specifically, it is assumed that any ship under study will be immediately reconfigured for civilian habitability in FY 79 and subsequently manned by civil service personnel (with Navy detachment) throughout the FYDP years. Furthermore, it is assumed that all ships which are budgeted for fleet entry during the FYDP years will be built to civilian habitability standards<sup>1/</sup>. Manpower requirements and costs reflect the Civil Service manning levels deemed necessary by MSC, and the military detachment manning levels proposed by the MSC. Operating costs are based on estimates provided by the MSC.

---

<sup>1/</sup>The AO-177 class ship is presently being built for Navy military manning. Hence, additional funds have been added for reconfiguration of this ship to civilian standards.

TABLE B-4

FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY MILITARY MANNING

SHIP TYPE: AF ( STORES SHIP)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS

REPRESENTATIVE SHIP - AF-58

DIRECT MPN = 2,409  
INDIRECT MPN = 2,609  
UTILITIES DIFFERENTIAL (NARM-SCENARIO) = 883  
DIRECT OMN = 4,341  
FUEL (SCENARIO) = 883  
DIRECT OMN = 4,341  
FUEL (NARM) IND OPERATE OMN = 1,274  
NEW CONSTRUCT = 140,924  
DIRECT OMN = 457

	ESCALATION FACTORS		
	FY 79	FY 80	FY 81
OMN PUR	1.1231	1.1680	1.2148
OMN POL	1.1929	1.3095	1.4169
OPN	1.1833	1.2366	1.2862
SCN	1.3854	1.4742	1.5686

FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	3,108	3,108	3,108	3,108	3,108	15,540
OMN	6,368	6,675	6,999	7,342	7,704	35,089
OPN	541	565	588	611	636	2,941
TOTAL	10,017	10,348	10,695	11,062	11,448	53,570

FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING SHIPS BUDGETED	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	3,108	3,108	3,108	3,108	3,108	15,540
OMN	6,368	6,675	6,999	7,342	7,704	35,089
OPN	541	565	588	611	636	2,941
TOTAL	10,017	10,348	10,695	11,062	11,448	53,570

TABLE B-5

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY MILITARY MANNING

SHIP TYPE: AFS ( COMBAT STORE)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AFS-3

DIRECT OMN = 4,282  
 INDIRECT OMN = 1,219  
 UTILITIES DIFFERENTIAL (NARM-SCENARIO) = 6,719  
 DIRECT OMN = 6,719  
 FUEL (SCENARIO) = 1,232  
 IND OPERATE OMN = 1,165  
 NEW CONSTRUCT = 180,383  
 DIRECT OMN = 524

	FY 79	FY 80	ESCALATION FACTORS	FY 81	FY 82	FY 83
OMN OUR	1,121	1,168	1,168	1,214	1,263	1,313
OMN POL	1,193	1,305	1,416	1,549	1,704	1,883
OPN	1,183	1,236	1,288	1,347	1,413	1,486
SCN	1,385	1,474	1,568	1,668	1,775	1,889

	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
FUNDING	=====	=====	=====	=====	=====	=====
OMN	5,501	5,501	5,501	5,501	5,501	27,505
OMN	9,476	9,929	10,406	10,910	11,441	52,162
OPN	620	648	674	701	729	3,372
TOTAL	15,597	16,078	16,581	17,112	17,671	83,039

	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
SHIPS OPERATING	=====	=====	=====	=====	=====	=====
SHIPS BUDGETED	=====	=====	=====	=====	=====	=====
OMN	38,507	38,507	38,507	38,507	38,507	192,535
OMN	66,333	69,503	72,840	76,369	80,988	365,132
OPN	4,340	4,536	4,718	4,907	5,103	23,604
TOTAL	109,180	112,545	116,065	119,783	123,698	581,271

TABLE B-6

FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY MILITARY MANNING

SHIP TYPE: AOR ( REPLENISHMENT OILER)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AOR-4

DIRECT OMN = 3,960  
INDIRECT OMN = 1,203  
UTILITIES DIFFERENTIAL (NARM-SCENARIO) = -9  
DIRECT OMN = 8,696  
FUEL (SCENARIO)=1,800  
DIRECT OMN = 1,750  
FUEL (NARM)  
IND OPERATE OMN = 1,867  
DIRECT OMN = 569  
NEW CONSTRUCT =157,835

ESCALATION FACTORS

	FY 79	FY 80	FY 81	FY 82	FY 83
OMN PUR	1.1231	1.1680	1.2148	1.2634	1.3139
OMN POL	1.1929	1.3095	1.4169	1.5449	1.6838
OPN	1.1833	1.2366	1.2862	1.3370	1.3913
SCN	1.3854	1.4742	1.5686	1.6689	1.7757

FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
OMN	5,163	5,163	5,163	5,163	5,163	25,815
OMN	11,816	12,385	12,984	13,617	14,285	65,088
OPN	673	704	732	761	792	3,662
=====	=====	=====	=====	=====	=====	=====
TOTAL	17,653	18,252	18,879	19,541	20,240	94,584

FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING SHIPS BUDGETED	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
OMN	36,141	36,141	36,141	36,141	36,141	180,705
OMN	82,715	86,695	90,886	95,321	99,996	455,613
OPN	4,713	4,925	5,123	5,329	5,541	25,631
=====	=====	=====	=====	=====	=====	=====
TOTAL	123,569	127,761	132,150	136,790	141,679	661,949



TABLE B-7

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY MILITARY MANNING

SHIP TYPE: AOE (FAST COMBAT SUPPORT)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AOE-3

DIRECT MPN = 5,305  
 INDIRECT MPN = 1,621  
 UTILITIES DIFFERENTIAL  
 DIRECT OMN = 9,588  
 FUEL (SCENARIO) = 1,678  
 (NARM-SCENARIO) = -11  
 FUEL (NARM)  
 IND OPERATE OMN = 1,992  
 NEW CONSTRUCT = 394,588  
 DIRECT OMN = 614

## ESCALATION FACTORS

OMN OUR	FY 79	FY 80	FY 81	FY 82	FY 83
OMN POL	1.1231	1.1680	1.2148	1.2634	1.3139
OPN	1.1929	1.3095	1.4169	1.5449	1.6838
SCN	1.1833	1.3666	1.5686	1.8370	2.2137
	1.3854	1.7442	2.2682	3.0089	3.9757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	6,926	6,926	6,926	6,926	6,926	34,630
OMN	13,117	13,742	14,400	15,096	15,829	72,184
OPN	727	759	790	821	854	3,951
TOTAL	20,769	21,427	22,116	22,843	23,609	119,765

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING SHIPS BUDGETED	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	27,704	27,704	27,704	27,704	27,704	138,520
OMN	52,467	54,968	57,600	60,383	63,316	288,735
OPN	2,966	3,037	3,159	3,286	3,417	15,805
TOTAL	83,077	85,709	88,463	91,373	94,437	443,060

TABLE B-8

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY MILITARY MANNING

SHIP TYPE: AE (AMMUNITION SHIP)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS

REPRESENTATIVE SHIP - AE-28

DIRECT M&N = 3,594  
 INDIRECT M&N = 1,002  
 UTILITIES DIFFERENTIAL

DIRECT OMN = 5,715  
 FUEL (SCENARIO) = 1,249  
 (NARM-SCENARIO) = -12

FUEL (NARM)  
 IND OPERATE OMN = 1,464

DIRECT OMN = 502  
 NEW CONSTRUCT = 146,361

## ESCALATION FACTORS

OMN PUR  
 OMN POL  
 OMN SCN

FY 79  
 1.1231  
 1.1929  
 1.1833  
 1.3834

FY 80  
 1.1680  
 1.3005  
 1.2366  
 1.4742

## ESCALATION FACTORS

FY 81  
 1.2148  
 1.4169  
 1.2862  
 1.5686

FY 82  
 1.2634  
 1.5449  
 1.3379  
 1.6669

FY 83  
 1.3139  
 1.6838  
 1.3913  
 1.7757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
M&N	4,596	4,596	4,596	4,596	4,596	22,980
OMN	7,820	8,207	8,616	9,050	9,508	43,201
OPN	594	621	646	672	698	3,230
TOTAL	13,010	13,424	13,858	14,318	14,803	69,411

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING SHIPS BUDGETED	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
M&N	59,748	59,748	59,748	59,748	59,748	298,740
OMN	191,655	196,694	112,009	117,649	123,606	561,613
OPN	7,722	8,070	8,394	8,731	9,079	41,996
TOTAL	169,125	174,511	180,151	186,128	192,433	902,349

TABLE B-9

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY MILITARY MANNING

SHIP TYPE: AO ( FLEET OILER)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AO-177

DIRECT MPN = 1,837  
INDIRECT MPN = 1,977  
UTILITIES DIFFERENTIAL

DIRECT OMN = 8,091  
FUEL (SCENARIO) = 1,943  
(NARM-SCENARIO) = 71

FUEL (NARM)  
IND OPERATE OMN = 1,268  
NEW CONSTRUCT = 152,198

## ESCALATION FACTORS

	FY 79	FY 80	FY 81	FY 82	FY 83
OMN OUR	1.1231	1.1680	1.2148	1.2634	1.3139
OMN POL	1.1929	1.3025	1.4169	1.5449	1.6838
OPN	1.1833	1.2366	1.2862	1.3379	1.3912
SCN	1.3854	1.4742	1.5686	1.6689	1.7757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	2,814	2,814	2,814	2,814	2,814	14,070
OMN	10,717	11,209	11,724	12,268	12,839	58,757
OPN	336	351	365	380	395	1,828
=====	=====	=====	=====	=====	=====	=====
TOTAL	13,867	14,374	14,904	15,462	16,048	74,655

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING SHIPS BUDGETED	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	45,024	45,024	47,838	53,466	53,466	244,818
OMN	171,478	179,337	199,314	233,088	243,938	1,027,155
OPN	5,377	5,619	6,210	7,219	7,507	31,932
=====	=====	=====	=====	=====	=====	=====
TOTAL	221,879	229,980	253,362	293,773	304,911	1,303,905

TABLE B-10

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY MILITARY MANNING

SHIP TYPE: AD ( DESTROYER TENDER)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AD-37

DIRECT MPN = 11,446  
 INDIRECT MPN = 3,176  
 UTILITIES DIFFERENTIAL (NARM-SCENARIO) = 14  
 DIRECT OMN = 3,003  
 FUEL (SCENARIO) = 584  
 IND OPERATE OMN = 457  
 FUEL (NARM)  
 NEW CONSTRUCT = 2,541  
 DIRECT OMN = 153  
 NEW CONSTRUCT = 226,943

## ESCALATION FACTORS

	FY 79	FY 80	FY 81	FY 82	FY 83
OWN PUR	1.1231	1.1680	1.2148	1.2634	1.3139
OWN POL	1.1929	1.3003	1.4169	1.5449	1.6838
OPN	1.1833	1.2366	1.2862	1.3379	1.3913
SCN	1.3654	1.4742	1.5686	1.6689	1.7757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	14,622	14,622	14,622	14,622	14,622	73,110
OWN	7,405	7,736	8,083	8,448	8,831	40,504
OPN	181	189	197	205	213	985
TOTAL	22,208	22,547	22,902	23,275	23,666	114,598

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING SHIPS BUDGETED	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	131,598	131,598	131,598	131,598	131,598	657,990
OWN	66,643	69,624	72,749	76,034	79,481	364,532
OPN	1,629	1,703	1,771	1,842	1,916	8,861
TOTAL	199,871	202,925	206,119	209,475	212,994	1,031,383

TABLE B-11

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY MILITARY MANNING

SHIP TYPE: AS ( SUBMARINE TENDER)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AS-36

DIRECT OMN = 11,870  
 INDIRECT OMN = 3,095  
 UTILITIES DIFFERENTIAL (NARM-SCENARIO) = 6,346  
 DIRECT OMN = 6,346  
 FUEL (SCENARIO) = 212  
 IND OPERATE OMN = 2,881  
 DIRECT OPN = 253  
 NEW CONSTRUCT = 276,212

## ESCALATION FACTORS

OMN PUR	FY 79	FY 80	FY 81	FY 82	FY 83
OMN POL	1.1231	1.1680	1.2148	1.2634	1.3129
OPN	1.1929	1.3095	1.4169	1.5449	1.6838
SCN	1.1833	1.2366	1.2862	1.3378	1.3913
	1.3854	1.4742	1.5686	1.6689	1.7757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	14,974	14,974	14,974	14,974	14,974	74,870
OMN	10,435	10,865	11,313	11,781	12,269	56,663
OPN	299	313	325	338	352	1,628
=====	=====	=====	=====	=====	=====	=====
TOTAL	25,708	26,152	26,613	27,094	27,595	133,161

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING SHIPS BUDGETED	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	179,688	179,688	179,688	179,688	179,688	898,440
OMN	125,217	130,379	135,762	141,374	147,224	679,955
OPN	3,592	3,754	3,905	4,062	4,224	19,537
=====	=====	=====	=====	=====	=====	=====
TOTAL	308,497	313,821	319,355	325,124	331,135	1,597,932

TABLE B-12

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY MILITARY MANNING

SHIP TYPE: AR ( HEAVY REPAIR SHIP)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AR-6

DIRECT OMN = 6,808  
 INDIRECT OMN = 2,967  
 UTILITIES DIFFERENTIAL (NARM-SCENARIO) = 25  
 DIRECT OMN = 4,616  
 FUEL (SCENARIO) = 456  
 IND OPERATE OMN = 2,388  
 FUEL (NARM)  
 DIRECT OMN = 131  
 NEW CONSTRUCT = 306,652

OMN PUR	FY 79	ESCALATION FACTORS	FY 82	FY 83
OMN POL	1,123	FY 81	1,263	1,313
OMN	1,103	1,214	1,544	1,683
OMN	1,183	1,469	1,337	1,391
SCN	1,354	1,286	1,379	1,757
		1,566	1,668	

FYDP COST ESTIMATES - PER SHIP						
FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	8,875	8,875	8,875	8,875	8,875	44,375
OMN	8,109	8,461	8,829	9,214	9,618	44,231
OPN	155	162	168	175	182	843
=====	=====	=====	=====	=====	=====	=====
TOTAL	17,139	17,498	17,872	18,265	18,675	89,449

FYDP COST ESTIMATES - FLEET TOTAL						
SHIPS OPERATING SHIPS BUDGETED	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	35,500	35,500	35,500	35,500	44,375	186,375
OMN	32,436	33,843	35,315	36,858	48,091	186,543
OPN	620	648	674	701	911	3,554
=====	=====	=====	=====	=====	=====	=====
TOTAL	68,556	69,991	71,489	73,959	93,377	376,472



TABLE B-13

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY MILITARY MANNING

SHIP TYPE: ARS (C SALVAGE SHIP)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - ARS-41DIRECT OMN = 1,049  
INDIRECT OMN = 1,258  
UTILITIES DIFFERENTIALDIRECT OMN = 1,547  
FUEL (SCENARIO) = 242  
IND OPERATE OMN = 16DIRECT OMN = 285  
NEW CONSTRUCT = 28,185FUEL (NARM)  
IND OPERATE OMN =

## ESCALATION FACTORS

	FY 79	FY 80	FY 81
OMN PUR	1,1231	1,1680	1,2148
OMN POL	1,1929	1,3095	1,4169
OMN	1,1833	1,2266	1,2862
SCN	1,3834	1,4742	1,5686

	FY 82	FY 83
OMN PUR	1,2634	1,3139
OMN POL	1,3449	1,4078
OMN	1,3278	1,3913
SCN	1,6689	1,7757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
OMN	1,307	1,307	1,307	1,307	1,307	6,535
OMN	2,502	2,617	2,737	2,864	2,997	13,717
OPN	337	352	367	381	397	1,834
TOTAL	4,147	4,276	4,411	4,552	4,701	22,086

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING SHIPS BUDGETED	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
OMN	7,842	7,842	7,842	7,842	7,842	39,210
OMN	15,014	15,791	16,423	17,184	17,983	82,305
OPN	2,023	2,115	2,199	2,288	2,379	11,004
TOTAL	24,879	25,658	26,465	27,313	28,204	132,519

TABLE B-14

FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY MILITARY MANNING

SHIP TYPE: ASR ( SALVAGE & RESCUE)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - ASR-22

DIRECT OMN = 2,056  
INDIRECT OMN = 2,501  
UTILITIES DIFFERENTIAL (NARM-SCENARIO) = 159  
DIRECT OMN = 2,758  
FUEL (SCENARIO) = 159  
IND OPERATE OMN = 890  
FUEL (NARM)  
NEW CONSTRUCT = 20,293  
DIRECT OMN = 131

ESCALATION FACTORS

	FY 79	FY 80	FY 81	FY 82	FY 83
OMN PUR	1.1231	1.1680	1.2148	1.2634	1.3139
OMN POL	1.1929	1.3005	1.4169	1.5449	1.6838
OPN	1.1833	1.2366	1.2862	1.3379	1.3913
SCN	1.3854	1.4742	1.5686	1.6689	1.7757

FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
OMN	2,557	2,557	2,557	2,557	2,557	12,785
GMN	4,122	4,296	4,478	4,669	4,868	22,432
OPN	155	162	168	175	182	843
=====	=====	=====	=====	=====	=====	=====
TOTAL	6,834	7,015	7,204	7,401	7,607	36,060

FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING SHIPS BUDGETED	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
OMN	15,342	15,342	15,342	15,342	15,342	76,710
GMN	24,729	25,776	26,869	28,012	29,206	134,592
OPN	930	972	1,011	1,052	1,094	5,058
=====	=====	=====	=====	=====	=====	=====
TOTAL	41,002	42,090	43,222	44,406	45,641	216,360

TABLE B-15

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY MILITARY MANNING

SHIP TYPE: ATF ( TOWING SHIP)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - ATF-166

DIRECT OMN = 497  
 INDIRECT OMN = 186  
 UTILITIES DIFFERENTIAL (NARM-SCENARIO) = 13  
 DIRECT OMN = 1,696  
 FUEL (SCENARIO) = 282  
 FUEL (NARM) = 154  
 IND OPERATE OMN = 597  
 DIRECT OMN = 267  
 NEW CONSTRUCT = 20,293

## ESCALATION FACTORS

OMN PUR	FY 79	FY 80	FY 81	FY 82	FY 83
OMN POL	1.1231	1.1680	1.2148	1.2634	1.3139
OPN	1.1929	1.3905	1.4169	1.5449	1.6838
SCN	1.1833	1.2366	1.2862	1.3779	1.4913
	1.3854	1.4742	1.5686	1.6669	1.7757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	686	686	686	686	686	3,430
OMN	2,629	2,746	2,869	2,998	3,133	14,375
OPN	316	330	343	357	371	1,718
=====	=====	=====	=====	=====	=====	=====
TOTAL	3,631	3,762	3,898	4,041	4,191	19,523

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING SHIPS BUDGETED	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
	2	10	11	11	10	
MPN	4,802	6,860	7,546	7,546	7,546	34,300
OMN	18,400	27,459	31,557	32,978	34,468	144,862
OPN	2,212	3,392	3,778	3,929	4,086	17,396
=====	=====	=====	=====	=====	=====	=====
TOTAL	25,414	37,621	42,889	44,453	46,100	196,468

TABLE B-16

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY MILITARY MANNING

SHIP TYPE: ATS ( TOWING &amp; SALVAGE)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - ATS-1

DIRECT MGN = 1,317  
INDIRECT MGN = 257  
UTILITIES DIFFERENTIAL (NARM-SCENARIO) = 148

DIRECT OMN = 2,457  
FUEL (SCENARIO) = 148  
IND OPERATE OMN = 24

DIRECT OMN = 61  
NEW CONSTRUCT = 50,733

## ESCALATION FACTORS

	FY 79	FY 80	FY 81	FY 82	FY 83
OMN PUR	1,123	1,168	1,214	1,263	1,313
OMN POL	1,193	1,238	1,283	1,328	1,373
OPN	1,183	1,228	1,273	1,318	1,363
SCN	1,383	1,428	1,473	1,518	1,563

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MGN	1,584	1,584	1,584	1,584	1,584	7,920
OMN	3,705	3,862	4,027	4,198	4,377	20,170
OPN	155	162	168	175	182	843
TOTAL	5,444	5,608	5,779	5,957	6,144	28,933

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING SHIPS BUDGETED	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MGN	4,752	4,752	4,752	4,752	4,752	23,760
OMN	11,116	11,587	12,080	12,594	13,132	60,509
OPN	465	486	505	526	547	2,529
TOTAL	16,333	16,825	17,337	17,872	18,431	86,798

They reflect normal MSC planning with respect to the operational scenarios developed by the Study Team. Indirect operating costs have also been added to reflect costs borne by the Navy in the area of base support.

b. The following methodology was used in order to derive estimates for each FYDP appropriation account, for the Navy Civil Service manning alternative.

(1) Direct manpower cost (MPN appropriation) consists of the cost of U.S. Navy military detachments only. All other personnel, i.e., civilians, are budgeted as part of the MSC appropriation which would be provided from the O&MN account. The sizes of the military detachments aboard each of the thirteen ship types under study are described in Appendix A. Similarly, the respective cost of each military detachment is derived in Appendix A.

(2) Indirect manpower costs, i.e., the cost of shore-based military support personnel, were extracted from the 1976 Program Factors Manual. These figures represent the manpower necessary for support of a totally military manned ship and, thus, had to be adjusted in order to reflect a reduction of certain base support personnel necessary for a ship with only partial military crew. As given in the Program Factors, indirect manpower costs are broken down according to the categories of personnel necessary for base operations, training, transients, health activities, recruiting and examining. PCS (Permanent Change of

Station) costs are also included. Of all these categories it is reasonable to assume that in each case, except for base operations, the manpower required for each activity is proportional to the number of men (aboard ship) being supported. Therefore, the cost of indirect manpower excluding base operations was proportionally reduced by the ratio of the size of the military detachment to the total SMD manning level. Base operations support personnel can be assumed to remain constant since these personnel vary according to the number and types of ships which operate out of U.S. Naval Bases. Since the number and types of ships are constants of this study, total base operation support personnel costs have been included as a fixed indirect cost.

c. Direct MPN budget costs have been calculated using Oct 76 Standard Military Composite Rates while indirect MPN costs have been calculated using the officer and enlisted pay factors developed in the NARM. In accordance with POM 79-15 no escalation factors have been applied to MPN budget appropriation estimates.

d. All costs for Navy Civil Service operation of fleet support ships are funded out of the Navy Industrial Fund. MSC bills the Navy for this service. These charges to the Navy include the cost of civilian manpower, operations, maintenance (including overhaul), reconfiguration/modification, and overhead surcharge.<sup>1/</sup>

---

<sup>1/</sup>The current surcharge for this service is 5%. Payment for these services is made from the Fleet Commander's O&MN Accounts



The O&MN appropriation to MSC does not include all costs which are incurred for support ship operation. Beside MSC direct costs are the expenses of shore based support facilities necessary for ship operating and support of military detachments. These indirect operating costs are included in the FYDP cost estimates of Navy Civil Service manned ships.

e. Costs of Civil Service crews were estimated by MSC for each of the thirteen representative ships and are fully described in Appendix A. A 5% MSC overhead surcharge was then added to these costs. In accordance with POM 79-15, no escalation has been applied to these manpower costs.

f. Operating and maintenance costs were also estimated for each representative ship. These estimates, as well as manpower costs, are based on the projected amount of activity of each particular ship type as detailed in the operating scenario. Direct operating cost for ships under Navy Civil Service manning include all costs for stores, fuel, and supplies. This amount has been estimated by MSC for each of the thirteen ship types under study. Stores and supply costs for military detachment personnel are included in the Military Standard Composite Rate and are accounted for under direct MPN costs. Another cost which must be accounted for is that of utilities while in port. The utilities cost was calculated on the basis of average cost of utilities per day in port, computed from the Program Factors for each representative

ship class. This amount was multiplied by the number of port days given in the operating scenario to give the estimated total annual utilities cost.

g. Operating costs, as estimated by MSC, are constant per year. In contrast, however, MSC maintenance costs, as estimated, vary from year to year. This is due to the MSC policy of overhauling ships biennially; i.e., every 2nd year (as opposed to every 3 or 4 years for the Navy). Also, MSC performs a 30 to 45 day "mid-period inspection" between overhaul years, at which time other repair work is performed. These actions result in a 6-year period of varying maintenance costs.

h. In order to compensate for yearly variances in maintenance costs, these costs have been annualized for budget purposes by dividing the total maintenance costs for the maintenance period by the length of the maintenance cycle; in this case 6 years. This provides a means of direct comparison with Navy military operation in which overhaul related maintenance costs are also annualized for budget purposes.

i. The final major direct cost component in the case of Navy Civil Service manning is that of reconfiguration of an existing Navy ship for purposes of civil service habitation. This basically involves modification of all accommodation areas of a ship for future use by civil service mariners. This ship modification also reflects current

contractual agreements between employers and maritime unions regarding habitation facilities aboard ship. Reconfiguration costs are included for all ship types except the AF & ATF since these ships are presently manned by Navy Civil Service crews and would therefore require no modification. Additionally, it has been assumed that any ship budgeted during the FYDP years for operation under the Navy Civil Service alternative is programmed for MSC operation and will not need any reconfiguration.

j. For the purposes of this study, it is assumed that all ships will undergo reconfiguration (if necessary) in FY 79. Although this assumption will conflict with the real life situation, it allows for the evaluation of budgetary impact given that a particular ship or type of ship will be turned over to MSC for Navy Civil Service operation.

k. There are 2 fleet support ships, the AO-177 and the AO-178, under construction at this time and programmed for post FY 79 fleet entry as Navy military manned ships. In this FYDP estimate it is assumed that all ships will be civil service manned. Therefore, a cost of converting these ships for civil service manning will be incurred prior to the entry of these ships into the force. This cost has been estimated by MSC as \$152,000 per ship. This estimate reflects redesign work only and has been added to the FY 79 FYDP estimate. This is the year prior to the scheduled entry of these ships into the fleet.

1. Reconfiguration cost, as estimated by MSC, includes costs for design, production, and operation (including manning with reduced crews) while undergoing modification. An estimate of time required (in months) to perform the modification has also been supplied. For the remainder of a reconfiguration year, a ship will be assumed to operate normally and incur regular operating costs. It should be noted that it is the policy of MSC to perform an overhaul of a ship while it is undergoing a reconfiguration. This is the first overhaul of the six year maintenance cycle mentioned before.

m. Indirect operating costs include the cost of maintaining facilities for shore based support of a particular ship and the embarked military detachment. Specifically, as delineated in the Program Factors, these are broken down into cost categories of logistics, base operating support, training, health activities, and recruiting and examining. However, as mentioned before regarding indirect manpower costs, the costs given in the Program Factors represent the amount of money necessary to support a particular ship with a full military crew. In the alternative being priced out, only a partial military crew is on board. Hence, these indirect operating costs had to be adjusted from figures given in the Program Factors. As with indirect manpower costs the assumption has been made that indirect Base Operating Support (BOS) costs remain

constant regardless of military crew size. Therefore, this cost is fully included. Indirect costs relating to health activities, training, and recruiting and examining have been scaled down according to the ratio of the size of the military detachment to the total SMD manning level. Indirect costs for logistics support are already included in the MSC direct operating costs and therefore have not been included a second time.

n. O&MN cost estimates for Navy Civil Service manning are summarized as follows. In FY 79, costs are incurred for reconfiguration, annualized maintenance, and for the portion of the year that the ship is operating, direct Civil Service manpower, direct operating expenses, indirect operating expenses, and utilities. For years FY 80 through FY 83 direct operating costs, Civil Service manpower costs, and utilities costs are incurred for the full year. In computing O&MN budget costs, an additional amount of five percent of any reconfiguration, maintenance, and direct operating cost (except for utilities) has been added in order to account for MSC overhead.

o. Operational, maintenance, and reconfiguration costs were estimated by MSC in FY 76 dollars. These were escalated to FY 77 dollars using a factor of 1.0820 derived from OSD indices.<sup>1/</sup> All costs derived from the Navy Program

---

<sup>1/</sup> Office of the Secretary of Defense (Comptroller),  
Economic Indices--Fiscal Years 1970-1986, January 18,  
1977

Factors Manual are in FY 77 dollars. The combined amount of the above costs were escalated using composite outlay/escalation rate tables as found in POM 79-15 in order to derive estimates for FYDP years FY 79 through FY 83. As mentioned before, no escalation has been applied to civilian manpower FY 77 cost estimates, as directed in POM 79-15.

p. The annual cost of the OPN account was estimated as the Direct OPN cost category of the Program Factors for each representative ship class. The OPN outlay/escalation factors provided in POM 79-15 for base year FY 77 were applied to obtain annual budgetary estimates for FY 79 through FY 83.

q. Projected plans for budgeting of new ship construction were obtained from the FYDP 2 March 1977 update. The unit cost of procurement for new ship construction is the same as for military manned ship construction. Costs for civil service manned ships are assumed equal to those of military ships as long as the superstructures that will house the mariners have not yet been built. The SCN cost is shown on the upper portion of the tables for information. Since the new construction cost is the same for each of the alternatives, it is not included in the appropriation category breakdown of the FYDP cost estimates.



r. The mathematical formulae used to estimate the cost elements of each appropriation account on a per ship basis follow. All estimates are based on costs in FY 77 dollars.

#### MPN

$$MPN_{Ti} = MPN_D + [MPN_I - (B_1 * F_1) - (B_2 * F_2)] * \frac{D}{S_0} + (B_1 * F_1) + (B_2 * F_2)$$

where:

$MPN_{Ti}$  = Total MPN cost in year i

$MPN_D$  = Direct MPN cost of Navy military detachment

$MPN_I$  = Total Indirect MPN cost from Program Factors

$B_1$  = Base Ops Officers from Program Factors

$B_2$  = Base Ops Enlisted from Program Factors

$F_1$  = 21, 427 = Officer Pay Factor from Program Factors

$F_2$  = 9,248 = Enlisted Pay Factor from Program Factors

$D$  = Size of Navy military detachment (men)

$S_0$  = SMD manning level (men)

---

#### O&MN

For reconfiguration year (FY 79):

$$OMN_{Ti} = [R + M + (OPS_D + OMN_N + U) * (1 - \frac{t}{12})] * E_i + [C * (1 - \frac{t}{12})]$$

For Regular Operating years (FY 80 - FY 83)

$$OMN_{Ti} = [M + OPS_D + OMN_N + U] * E_i + C$$

where:

$OMN_{Ti}$  = Total O&MN cost for year i

R = Reconfiguration cost estimate \* 1.05

M = Annualized Maintenance Cost \* 1.05

1.05 = MSC overhead rate

$OPS_D$  = MSC direct operating cost calculated as follows

$$OPS_D = (OPS_A) * 1.05$$

where:

$OPS_A$  = MSC annual ship operating cost

$OMN_N$  = Cost of support services provided by Navy  
calculated as:

$$(OMN_I - L - BOS) * \frac{D}{S_o} + BOS$$

where:

$OMN_I$  = Indirect Cost from Program Factors

L = Logistics O&MN cost from Program Factors

BOS = Base Operating Support O&MN cost from Program  
Factors

D = Size of Navy military detachment

$S_o$  = SMD manning level (men)

U = Utilities cost as adjusted from Program Factors to  
reflect projected operating scenario

$E_i$  = Escalation factor for O&MN purchases for year i

C = Total annual cost of civilian ship crew \* 1.05

t = Length of time necessary to reconfigure/modify ship, in  
months

### OPN

$$OPN = OPN_D * G_i$$

where:

$OPN_D$  = Direct OPN from Program Factors

$G_i$  = Escalation factor for OPN, year i

---

Cost estimates for the total fleet of a particular ship type are derived by multiplying each appropriation account by the number of ships operating each year.

s. The budget estimates for the FYDP years FY 79 through FY 83 are given in Tables B-17 through B-30. Two tables are shown for ships of the AO type. One table provides FYDP estimates for AO type ships presently manned by Navy Military personnel (and programmed to be so manned by FY 79) and requiring reconfiguration; and other displays estimates for ships presently manned by Civil Service mariners (or programmed to be so manned by FY 79) and not requiring reconfiguration.

### 3. Commercial Contract Manning

a. The FYDP estimates for Commercial Contract manning are primarily based on data supplied by the Maritime Administration (MARAD) and the MSC, as well as additional factors extracted from the Navy Program Factors Manual. This is an analysis of the Commercial Contract crew operation of the ships under study. Specifically, it is assumed that any ship under study will be immediately

TABLE B-17

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY CIVIL SERVICE MANNING

SHIP TYPE: AF ( STORES SHIP)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AF-58

NAVY DIRECT MPN	=	192	BOS OFF (MAN YR)	=	8	BASE OPS OMN	=	141	MSC OPS (ANNUAL)	=	1,421
NAVY IND MPN	=	699	BOS ENL (MAN-YR)	=	5.8	UTILITIES	=	27	MSC MAINT (ANNUAL)	=	1,002
NAVY DET (MEN)	=	18	IND OPERATE OMN	=	1,274	DIRECT OMN	=	457	RECONFIGURE/MODIFY	=	0
SND MANNING (MEN)	=	259	LOGISTICS OMN	=	1,975	MSC MANPOWER COST	=	2,674	NEW CONSTRUCTION	=	149,924
											( 0 MO.)
ESCALATION FACTORS											
		FY 79	FY 80	FY 81	FY 82	FY 83					
OMN PUR		1.1231	1.1580	1.2148	1.2634	1.3139					
OMN POL		1.1629	1.3095	1.4169	1.5449	1.6838					
OPN		1.1833	1.2366	1.2802	1.3379	1.3913					
SCN		1.3854	1.4742	1.5686	1.6689	1.7757					

B-37

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	308	308	308	308	308	1,541
OPN	5,866	5,988	6,116	6,248	6,386	30,603
=====	=====	=====	=====	=====	=====	=====
SCN	541	565	588	611	636	2,941
=====	=====	=====	=====	=====	=====	=====
TOTAL	6,715	6,862	7,012	7,168	7,330	35,086

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	308	308	308	308	308	1,541
OPN	5,866	5,988	6,116	6,248	6,386	30,603
=====	=====	=====	=====	=====	=====	=====
SCN	541	565	588	611	636	2,941
=====	=====	=====	=====	=====	=====	=====
TOTAL	6,715	6,862	7,012	7,168	7,330	35,086

TABLE B-18

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY CIVIL SERVICE MANNING

SHIP TYPE: AFS (COMBAT STORE)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AFS-3[illegible]

B-38

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MON	501	501 + 213 <sup>1</sup> / <sub>1</sub>	501	501	501	2,720
GMN	11,069	6,963 + 11 <sup>1</sup> / <sub>1</sub>	7,107	7,257	7,413	39,821
OPN	620	648	674	701	729	3,372
TOTAL	12,190	8,336	8,283	8,460	8,644	45,913

FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	3,509	3,509 + 1491 <sup>1/</sup>	3,509	3,509	3,509	19,038
OMN	77,483	48,742 + 77 <sup>1/</sup>	49,752	50,802	51,893	278,750
OPN	4,340	4,536	4,718	4,907	5,103	23,604
TOTAL	85,333	58,355	57,979	59,219	60,506	321,392

1/ These are the Military Detachment costs for the first operating year only for the purpose of training Navy Civil Service Personnel in ship logistic cargo management.

TABLE B-19

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY CIVIL SERVICE MANNING

SHIP TYPE: AOR (REPLENISHMENT OILER)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AOR-4

NAVY DIRECT MGN	=	316	BOS OFF (MAN YR)	=	.8	BASE OPS OMN	=	245	MSC OPS (ANNUAL)	=	1,966
NAVY IND MGN	=	1,219	BOS ENL (MAN-YR)	=	19.1	UTILITIES	=	114	MSC MAINT (ANNUAL)	=	1,628
NAVY DET (MEN)	=	39	IND OPERATE OMN	=	1,581	DIRECT OMN	=	524	RECONFIGURE/MODIFY	=	6,971 ( 7 MO.)
SEA MANNING (MEN)	=	447	LOGISTICS OMN	=	1,059	MSC MANPOWER COST	=	3,054	NEW CONSTRUCTION	=	189,383

## ESCALATION FACTORS

FY 79	FY 80	FY 81	FY 82	FY 83
OMN BUR	1.1231	1.1689	1.2634	1.3139
OMN POL	1.1929	1.2148	1.2634	1.3139
OPN	1.1833	1.4169	1.5449	1.6838
SCN	1.3854	1.2862	1.3379	1.3913
		1.5686	1.6689	1.7757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MGN	501	501	501	501	501	2,507
GMN	12,973	8,423	8,632	8,849	9,074	47,950
OPN	620	648	674	701	729	3,372
=====	=====	=====	=====	=====	=====	=====
TOTAL	14,094	9,572	9,807	10,051	10,305	53,829

B-39

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MGN	3,509	3,509	3,509	3,509	3,509	17,547
GMN	90,809	58,960	60,422	61,941	63,520	335,652
OPN	4,340	4,536	4,718	4,907	5,103	23,604
=====	=====	=====	=====	=====	=====	=====
TOTAL	98,659	67,005	68,649	70,357	72,133	376,803



TABLE B-20

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY CIVIL SERVICE MANNING

SHIP TYPE: ACE (FAST COMBAT SUPPORT)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AOE-3

NAVY DIRECT MNN	=	431	BOS OFF (MAN YR)	=	1.1	BASE OPS OMN	=	331	MSC OPS (ANNUAL)	=	1,837
NAVY IND MNN	=	1,621	BOS ENL (MAN-YR)	=	13.6	UTILITIES	=	108	MSC MAINT (ANNUAL)	=	2,357
NAVY DET OMN	=	49	IND OPERATE OMN	=	2,299	DIRECT OMN	=	614	RECONFIGURE/MODIFY	=	6,097
SEA MANNING (MEND)	=	568	LOGISTICS OMN	=	1,566	MSC MANPOWER COST	=	4,371	NEW CONSTRUCTION	=	394,588

## ESCALATION FACTORS

OMN PUR	FY 79	FY 80	FY 81	FY 82	FY 83
OMN POL	1.1331	1.1680	1.2148	1.2634	1.3139
OMN	1.1626	1.2095	1.2663	1.3379	1.4138
SCN	1.1833	1.2366	1.2966	1.3689	1.4457

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MNN	684	684	684	684	684	3,421
OMN	11,789	19,277	10,504	19,741	19,987	54,298
OMN	727	759	799	821	854	3,951
=====	=====	=====	=====	=====	=====	=====
TOTAL	13,200	11,720	11,976	12,247	12,525	61,679

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MNN	2,737	2,737	2,737	2,737	2,737	13,684
OMN	47,156	41,197	42,918	42,964	43,948	217,192
OMN	2,906	3,037	3,159	3,286	3,417	15,805
=====	=====	=====	=====	=====	=====	=====
TOTAL	52,798	46,881	47,913	48,987	50,102	246,681

TABLE B-21

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY CIVIL SERVICE MANNING

SHIP TYPE: AE (AMMUNITION SHIP)

COST FACTORS -- THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP -- AE-28

NAVY DIRECT MPN	=	318	BOS OFF (MAN YR)	=	8.7	BASE OPS OMN	=	203	MSC OPS (ANNUAL)	=	1,229
NAVY IND MPN	=	1,002	BOS ENL (MAN-YR)	=	8.4	UTILITIES	=	93	MSC MAINT (ANNUAL)	=	1,291
NAVY DET (MEN)	=	27	IND OPERATE OMN	=	1,373	DIRECT OPN	=	502	RECONFIGURE (MODIFY)	=	5,540
S&D MANNING (MEN)	=	362	LOGISTICS OMN	=	1,940	MSC MANPOWER COST	=	2,960	NEW CONSTRUCTION	=	146,561
ESCALATION FACTORS											
FY 79		FY 80		FY 81		FY 82		FY 83		FY 84	
OMN	PUR	1.1231	1.1680	1.2148	1.2634	1.3135	1.3638	1.4149	1.4678	1.5215	1.5760
OPN	POL	1.1166	1.1605	1.2068	1.2549	1.3037	1.3532	1.4034	1.4543	1.5059	1.5582
OPN	SCN	1.1166	1.1605	1.2068	1.2549	1.3037	1.3532	1.4034	1.4543	1.5059	1.5582
SCN		1.1166	1.1605	1.2068	1.2549	1.3037	1.3532	1.4034	1.4543	1.5059	1.5582

B-41

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MAN	474	474	474	474	474	2,371
OMN	9,691	6,563	6,702	6,845	6,995	36,796
OPN	594	621	646	672	698	3,230
TOTAL	10,759	7,658	7,821	7,991	8,167	42,397

## FYDD.COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79 13	FY 80 13	FY 81 13	FY 82 13	FY 83 13	TOT/ELEMENT
NON	6,165	6,165	6,165	6,165	6,165	30,824
GMN	125,983	85,322	87,120	88,989	90,932	478,347
OPN	7,722	8,070	8,394	8,731	9,079	41,996
TOTAL	139,870	99,557	101,679	103,885	106,176	551,167

TABLE B-22

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY CIVIL SERVICE MANNING

SHIP TYPE: AO ( FLEET OILER)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AO-177

NAVY DIRECT MPN	=	215	BOS OFF (MAN-VR)	=	1.7	BASE OPS OMN	=	199	MSC OPS (ANNUAL)	=	1,465
NAVY IND MPN	=	977	BOS ENL (MAN-VR)	=	8.2	UTILITIES	=	224	MSC MAINT (ANNUAL)	=	1,017
NAVY DET (MEN)	=	19	IND OPERATE OMN	=	1,683	DIRECT OMN	=	284	RECONFIGURE/MODIFY	=	5,554
SMD MANNING (MEN)	=	183	LOGISTICS OMN	=	1,260	MSC MANPOWER COST	=	2,362	NEW CONSTRUCTION	=	152,198

## ESCALATION FACTORS

	FY 79	FY 80	FY 81	FY 82	FY 83
OMN PUR	1.1231	1.1680	1.2148	1.2634	1.3139
OMN POL	1.1029	1.1095	1.4169	1.5449	1.6838
OPN	1.1833	1.2366	1.2862	1.3379	1.3913
SCN	1.3834	1.4742	1.5686	1.6689	1.7757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	397	397	397	397	397	1,985
OMN	9,318	6,045	6,188	6,336	6,491	34,379
OPN	336	351	365	380	395	1,828
=====	=====	=====	=====	=====	=====	=====
TOTAL	10,051	6,794	6,950	7,113	7,283	38,191

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	3,175	3,175	3,175	3,175	3,175	15,876
OMN	74,547	48,363	49,595	50,692	51,925	275,033
OPN	2,688	2,809	2,922	3,040	3,161	14,621
=====	=====	=====	=====	=====	=====	=====
TOTAL	80,411	54,348	55,603	56,907	58,262	305,530

TABLE B-23

## FIVE YEAR DEFENSE PROGRAM (FYDP) -- NAVY CIVIL SERVICE MANNING

SHIP TYPE: AO (FLEET OILER)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AC-177[illegible]

## FYDP COST ESTIMATES - PER SHIP.

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
NPN	397	397	397	397	397	1,985
GMN	5,908	6,045	6,188	6,336	6,491	30,969
CPN	336	351	365	380	395	1,828
TOTAL	6,641	6,794	6,950	7,113	7,283	34,781

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
	8	8	9	11	11	
	=====	=====	=====	=====	=====	=====
MPN	3,175	3,175	3,572	4,366	4,366	18,655
GMN	47,266	388 1/2	55,693	69,701	71,398	292,810
OPN	2,688	2,809	3,288	4,180	4,346	17,311
	=====	=====	=====	=====	=====	=====
TOTAL	53,518	54,348	62,553	78,247	80,110	328,775

1/ Reconfigure AO-177 and AO-178 (now under construction)

TABLE B-24

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY CIVIL SERVICE MANNING

SHIP TYPE: AD ( DESTROYER TENDER)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AD-37

NAVY DIRECT M&N	=																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
-----------------	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	9,183	9,183	9,183	9,183	9,183	45,917
OWN	10,721	8,002	8,195	8,396	8,605	43,919
OPN	181	189	197	205	213	985
TOTAL	20,086	17,374	17,575	17,784	18,001	99,829

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
	9	9	9	9	9	
	=====	=====	=====	=====	=====	=====
MON	82,650	82,650	82,650	82,650	82,650	413,252
CMN	96,493	72,915	73,755	75,564	77,444	395,271
CPN	1,629	1,703	1,771	1,842	1,916	8,861
	=====	=====	=====	=====	=====	=====
TOTAL	189,773	156,368	158,177	160,056	162,010	817,384





TABLE B-26

## FIVE YEAR DEFENSE PROGRAM (FYDP) -- NAVY CIVIL SERVICE MANNING

SHIP TYPE: AR (HEAVY REPAIR SHIP)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AR-6[illegible]

## FYDP COST ESTIMATES - PER SHIP.

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	4,588	4,588	4,588	4,588	4,588	22,939
OPN	17,020	6,886	7,036	7,192	7,355	45,489
OPN	155	162	168	175	182	843
TOTAL	21,762	11,635	11,792	11,955	12,125	69,270

FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79 4	FY 80 4	FY 81 4	FY 82 4	FY 83 5	TOT/ELEMENT
MPN	18,351	18,351	18,351	18,351	22,939	96,342
GMN	68,079	27,543	28,144	28,770	36,775	189,310
CPN	620	648	674	701	911	3,554
TOTAL	87,050	46,541	47,169	47,821	60,624	289,206

TABLE B-27

## FIVE YEAR DEFENSE PROGRAM (FYDP) -- NAVY CIVIL SERVICE MANNING

SHIP TYPE: ARS ( SALVAGE SHIP)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - ARS-41

[illegible]

## B-47

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	104	104	104	104	104	519
GMN	3,877	2,316	2,375	2,436	2,499	13,503
OPN	337	352	367	381	397	1,834
TOTAL	4,318	2,772	2,845	2,921	2,999	15,856

FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
	623	623	623	623	623	3,116
MON	23,203	13,896	14,248	14,614	14,995	81,017
OPN	2,023	2,115	2,199	2,288	2,379	11,004
TOTAL	25,910	16,634	17,071	17,525	17,997	95,137

TABLE B-28

## FIVE YEAR DEFENSE PROGRAM (FYDP) -- NAVY CIVIL SERVICE MANAGING

SHIP TYPE: ASR ( SALVAGE &amp; RESCUE)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - ASR-22

NAVY DIRECT MPN	=	306	BOS OFF (MAN YR)	=	3	BASE OPS CMN	=	191	MSC OPS (ANNUAL)	=	374
NAVY IND MPN	=	501	BOS ENL (MAN-YR)	=	4.2	UTILITIES	=	96	MSC MAINT (ANNUAL)	=	912
NAVY DET (MEN)	=	29	IND OPERATE CMN	=	890	DIRECT OPN	=	131	RECONFIGURE/MODIFY	=	3,774
SND MANNING (MEN)=		209	LOGISTICS CMN	=	674	MSC MANPOWER	COST	1,534	NEW CONSTRUCTION		20,293

ESCALATION		FACTORS	
FY 79	FY 80	FY 81	FY 82
1.1231	1.1680	1.2148	1.2634
1.1452	1.1390	1.1416	1.1549
1.1343	1.1236	1.1286	1.1379
1.1385	1.1474	1.1456	1.1669

CMN PUR	CMN POL	CMN	SCN
		FY 83	
		1.3130	
		1.3638	
		1.3912	
		1.3757	

## B-48

FYD<sup>o</sup> COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MON	415	415	415	415	415	2,075
GRN	6,481	3,437	3,510	3,586	3,665	29,679
OPN	155	162	168	175	182	843
TOTAL	7,051	4,014	4,094	4,176	4,262	23,597

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MON	2,490	2,490	2,490	2,490	2,499	12,459
OWN	38,883	29,622	21,069	21,516	21,999	124,972
OPN	530	972	1,011	1,052	1,064	5,058
=====	=====	=====	=====	=====	=====	=====
TOTAL	42,303	24,084	24,561	25,058	25,574	141,589

TABLE B-29

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY CIVIL SERVICE MANNING

SHIP TYPE: ATF (TOWING SHIP)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - ATF-166

NAVY DIRECT MGN	=	42	BOS OFF (MAN YR)	=	1	BASE OPS CMN	=	38	MSC OPS (ANNUAL)	=	544
NAVY IND MGN	=	189	BOS ENL (MAN YR)	=	1.5	UTILITIES	=	49	MSC MAINT (ANNUAL)	=	541
NAVY DET (MEN)	=	4	IND OPERATE CMN	=	597	DIRECT CMN	=	267	RECON-IGRE/MODIFY	=	9
SPD MANNING (MEN)	=	45	LOGISTICS CMN	=	517	MSC MANPOWER COST	=	536	NEW CONSTRUCTION	=	20,293

## ESCALATION FACTORS

FY 79	FY 80	FY 81	FY 82	FY 83
1.1231	1.1689	1.2148	1.2634	1.3139
1.1626	1.3095	1.4169	1.5449	1.6838
1.1626	1.2366	1.2862	1.3379	1.3913
1.3854	1.4742	1.5686	1.6689	1.7757

CMN PUK
CMN PCL
CMN
SCN

B-49

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MGN	74	74	74	74	74	372
OMN	1,934	1,989	2,046	2,106	2,167	10,243
OPN	316	330	343	357	371	1,718
=====	=====	=====	=====	=====	=====	=====
TOTAL	2,325	2,394	2,464	2,537	2,613	12,333

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MGN	526	743	817	817	817	3,716
OMN	13,540	19,892	22,510	23,162	23,841	102,946
OPN	2,212	3,302	3,776	3,929	4,086	17,306
=====	=====	=====	=====	=====	=====	=====
TOTAL	16,272	23,937	27,105	27,909	28,745	123,968

TABLE B-30

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY CIVIL SERVICE MANNING

SHIP TYPE: ATS (TOWING &amp; SALVAGE)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - ATS-1

NAVY DIRECT MPN	=	155	BOS OFF (MAN YR)	=	2	BASE OPS OMN	=	53	MSC OPS (ANNUAL)	=	479
NAVY IND MPN	=	267	BOS ENL (MAN-YR)	=	2.2	UTILITIES	=	42	MSC MAINT (ANNUAL)	=	945
NAVY DET (MEN)	=	14	IND OPERATE OMN	=	770	DIRECT OMN	=	131	RECONFIGURE/MODIFY	=	75 ( 6 MO.)
SMD MANNING (MEN)	=	134	LOGISTICS OMN	=	657	MSC MANPOWER COST	=	850	NEW CONSTRUCTION	=	50,733

## ESCALATION FACTORS

FY 79	FY 80
GMN PUR	1.1680
GMN POL	1.1629
OPN	1.1833
SCN	1.3854

FY 82	FY 83
1.2634	1.3139
1.5449	1.6838
1.3379	1.3913
1.6689	1.7757

R-50

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	204	204	204	204	204	1,022
OMN	1,989	2,758	2,833	2,910	2,991	13,481
OPN	155	162	168	175	182	843
TOTAL	2,348	3,125	3,206	3,290	3,378	15,347

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	613	613	613	613	613	3,067
OMN	5,966	8,274	8,498	8,731	8,973	40,444
OPN	465	486	505	526	547	2,529
TOTAL	7,045	9,374	9,617	9,871	10,134	46,040

reconfigured for commercial contract habitability, in FY 79 and subsequently manned by Commercial Contract personnel (with Navy detachment) throughout the FYDP year. Furthermore, it is assumed that all ships which are budgeted for fleet entry during the FYDP years will be built to civilian habitation standards.<sup>1/</sup> Manpower requirements and costs reflect the Commercial Contract manning levels submitted by MARAD, and the military detachment manning levels developed by the Study Team. Indirect operating costs have also been added to reflect costs borne by the Navy in the area of base support.

b. The following methodology was used in order to derive estimates for each FYDP appropriation account for the Commercial Contract manning alternative.

(1) Direct manpower cost (MPN appropriation) consists of the cost of U.S. Navy military detachments only. All other personnel; i.e., civilians, are budgeted as part of the MSC contract which would be provided from the O&MN account. This is because the MSC would contract with commercial operators to man and operate the ships. The sizes of the military detachments aboard each of the thirteen ship types under study are described in Appendix A.

---

<sup>1/</sup> The AO-177 class ship is presently being built for Navy military manning. Hence, additional funds have been added for reconfiguration of this ship to civilian standards.



Similarly, the respective cost of each military detachment is derived in the same appendix.

(2) Indirect manpower costs; i.e., the cost of shore based military support personnel, were extracted from the 1976 Program Factors Manual. These figures represent the manpower necessary for support of a totally military manned ship and, thus, had to be adjusted in order to reflect the base support personnel necessary for a ship with only a partial military crew. As given in the Program Factors, indirect manpower costs are broken down according to the categories of personnel necessary for base operation, training, transients, health activities, recruiting and examining. PCS (Permanent Change of Station) costs are also included. Of all these categories, it is reasonable to assume that in each case, except for base operations, the manpower required for each activity is proportional to the number of men (aboard ship) being supported. Therefore, the cost of indirect manpower excluding base operations was proportionally reduced by the ratio of the size of the military detachment to the total SMD manning level. Base operations support personnel can be assumed to remain constant since these personnel vary according to the number and types of ships which operate out of U.S. Naval bases. Since the number and types of ships are constants of this study, total base operation support personnel costs have been included as a fixed indirect cost.

c. Direct MPN budget costs have been calculated using Oct 76 Standard Military Composite Rates while indirect MPN costs have been calculated using the officer and enlisted pay factors as developed in the NARM. In accordance with POM 79-15 no escalation factors have been applied to MPN budget appropriation estimates.

d. All costs for commercial contract operation of fleet support ships are funded out of the Navy Industrial Fund. MSC bills the Navy for administering the contracts. This charge to the Navy includes the cost of civilian manpower, operations, maintenance (including overhaul), reconfiguration/modification, Personal and Indemnity (P&I) insurance, contract fee and an MSC overhead surcharge.<sup>1/</sup> Payment for these services is made from the Navy's O&MN budget appropriation. The O&MN appropriation to MSC does not include all costs which are incurred for support ship operation. Above and beyond MSC direct costs are costs for shore based support facilities necessary for ship operating and support of military detachments. These indirect operating costs were accounted for as well.

e. Costs of commercial crews were estimated by MARAD for each of the thirteen representative ships. These costs were presented in FY 77 dollars and include a 4% MSC overhead charge. In accordance with POM 79-15, no escalation has been applied to these manpower costs.

---

<sup>1/</sup> The current surcharge for this service is 4%.

c. Direct MPN budget costs have been calculated using Oct 76 Standard Military Composite Rates while indirect MPN costs have been calculated using the officer and enlisted pay factors as developed in the NARM. In accordance with POM 79-15 no escalation factors have been applied to MPN budget appropriation estimates.

d. All costs for commercial contract operation of fleet support ships are funded out of the Navy Industrial Fund. MSC bills the Navy for administering the contracts. This charge to the Navy includes the cost of civilian manpower, operations, maintenance (including overhaul), reconfiguration/modification, Personal and Indemnity (P&I) insurance, contract fee and an MSC overhead surcharge.<sup>1/</sup> Payment for these services is made from the Navy's O&MN budget appropriation. The O&MN appropriation to MSC does not include all costs which are incurred for support ship operation. Above and beyond MSC direct costs are costs for shore based support facilities necessary for ship operating and support of military detachments. These indirect operating costs were accounted for as well.

e. Costs of commercial crews were estimated by MARAD for each of the thirteen representative ships. These costs were presented in FY 77 dollars and include a 4% MSC overhead charge. In accordance with POM 79-15, no escalation has been applied to these manpower costs.

---

<sup>1/</sup> The assumed surcharge for this service is 4%.

in port, computed from the Program Factors for each representative ship class. This amount was multiplied by the number of port days given in the operating scenario to give estimated total annual utilities cost.

i. Operating costs, as estimated by MSC, are assumed constant per year. In contrast, however, MSC maintenance costs, as estimated, vary from year to year. This is due to the MSC policy of overhauling ships biennially, i.e., every 2nd year as opposed to every 3 or 4 years for the Navy. Also, MSC performs a 30 to 45 day "mid-period inspection" between overhaul years, at which time other repair work is performed. These actions result in a 6 year period of varying maintenance costs. In order to compensate for yearly variances in maintenance costs, these costs have been annualized for budget purposes by dividing the total maintenance costs for the maintenance period by the length of the maintenance cycle, in this case 6 years. This provides a means of direct comparison with Navy military operation, in which overhaul related maintenance costs are also annualized for budget purposes.

j. The final major direct cost component in the case of Commercial Contract manning is that of reconfiguration of an existing Navy ship for purposes of commercial contract habitation. This basically involves modification of all accommodation areas of a ship for future use by civilian mariners. This ship modification also reflects

current contractual agreements between employers and maritime unions regarding habitation facilities aboard ship. Reconfiguration costs for all ship types except the AF and ATF have been estimated by MARAD. Costs were not estimated for the AF and ATF since these ships are presently manned by Navy Civil Service crews and would require no further modification. Additionally, it has been assumed that any ship budgeted during the FYDP years for operation under the Navy commercial contract alternative is programmed for MSC operation and will not need any reconfiguration.

k. For the purpose of this study, it is assumed that all ships will undergo reconfiguration (if necessary) in FY 79. Although this assumption may conflict with the real life situation, it allows for the evaluation of budgetary impact given that a particular ship or type of ship will be turned over to MSC for contract operation. There are 2 fleet support ships, the AO-177 and the AO-178, under construction at this time and programmed for post FY 79 fleet entry as Navy military manned ships. In this FYDP estimate it is assumed that all ships will be commercially manned. Therefore, a cost of converting these ships for Commercial Contract manning will be incurred prior to the entry of these ships into the force. This cost has been estimated by MSC as \$152,000 per ship, and has been used for the commercial contract analysis. This estimate reflects redesign work only and has been added to the FY 79 FYDP estimate for the commercial contract alternative.

This is the year prior to the scheduled entry of these ships into the fleet.

1. Reconfiguration cost, as estimated by MARAD, includes costs for design, production, and operation (including manning with reduced crew) while undergoing modification. An estimate of time required (in months) to perform the modification has also been supplied. Since overhaul is much more time-consuming than reconfiguration, and MSC maintenance cost is assumed for the commercial contract alternative, the reconfiguration/modification times provided by MSC were utilized. For the remainder of a reconfiguration year, a ship will be assumed to operate normally and incur regular operating costs.

m. Indirect operating costs include the cost of maintaining facilities for shore based support of a particular ship and the embarked military detachment. Specifically, as delineated in the Program Factors, these are broken down into cost categories of logistics, base operating support, training, health activities, and recruiting and examining. However, as mentioned before regarding indirect manpower costs, the costs given in the Program Factors represent the amount of money necessary to support a particular ships with a full military crew. In the alternative being priced out, only a partial military crew is on board. Hence, these indirect operating costs had to be adjusted from the amount given in the Program Factors.

○



n. As with indirect manpower costs the assumption has been made that indirect Base Operating Support (BOS) costs remain constant regardless of military crew size. Therefore, this cost is fully included. Indirect costs relating to health activities, training, and recruiting and examining have been scaled down according to the ratio of the size of the military detachment to the total SMD manning level. Indirect costs for logistics support are already included in the MSC overhead charge and therefore have not been included a second time.

o. O&MN cost estimates for Commercial Contract manning are summarized as follows. In FY 79, costs are incurred for reconfiguration, annualized maintenance and, for the portion of the year that the ship is operating, direct contract manpower, operating expenses, indirect operating expenses, and utilities. For years FY 80 through FY 83 direct operating costs, indirect operating costs, annualized maintenance costs, commercial contract manpower costs, and utilities costs are incurred for the full year. In computing O&MN budget costs, an additional amount of four percent of any reconfiguration, maintenance and direct operating cost (except for utilities) has been added in order to account for MSC overhead.

p. Operational and maintenance costs estimated by MSC were provided in FY 76 dollars. These were escalated to FY 77 dollars using a factor of 1.0820 derived from the OSD

indices. All costs provided for operations and reconfiguration by MARAD or derived from the Navy Program Factors Manual are in FY 77 dollars. The combined amount of the above costs were escalated using composite outlay/escalation rate tables as found in POM 79-15 in order to derive estimates for FYDP years FY 79 through FY 83. As mentioned above, no escalation has been applied to commercial contract manpower FY 77 cost estimates, as directed in POM 79-15.

q. The annual cost of the OPN account was estimated as the Direct OPN cost category of the Program Factors for each representative ship class. The OPN outlay/escalation factors provided in POM 79-15 for base year FY 77 were applied to obtain budgetary estimates for FY 79 through 83.

r. The projected plans for budgeting of new ship construction were obtained from the March 2, 1977 FYDP update. The unit cost of the procurement for new ship construction is the same as for military manned ship construction. Costs for commercial contract manned ships are considered equal to those of military ships as long as the superstructures that will house the mariners have not yet been built. The SCN cost is shown on the upper portion of the tables for information. Since the new construction cost is the same for each of the alternatives, it is not included in the appropriation category breakdown of the FYDP cost estimates.

s. The mathematical formulae used to estimate the cost elements for each appropriation account on a per ship basis are as follows. All estimates are based on costs in FY 77 dollars.

#### MPN

$$MPN_{Ti} = MPN_D + [MPN_I - (B_1 * F_1) - (B_2 * F_2)] * \frac{D}{S_0} + (B_1 * F_1) + (B_2 * F_2)$$

where:  $MPN_{Ti}$  = Total MPN cost in year i

$MPN_D$  = Direct MPN cost of Navy military detachment

$MPN_I$  = Total Indirect MPN cost from Program Factors

$B_1$  = Base Ops Officers from Program Factors

$B_2$  = Base Ops Enlisted from Program Factors

$F_1$  = 21,427 = Officer Pay Factor from Program Factors

$F_2$  = 9,248 = Enlisted Pay Factor from Program Factors

$D$  = Size of Navy military detachment (men)

$S_0$  = SMD manning level (men)

#### O&MN

For reconfiguration year (FY 79):

$$OMN_{Ti} = [R + M + (OPS_D + OMN_N + U) * (1 - \frac{t}{12})] * E_i + [C * (1 - \frac{t}{12})]$$

For regular Operating years (FY 80 - 83)

$$OMN_{Ti} = [M + OPS_D + OMN_N + U] * E_i + C$$

where:  $OMN_{Ti}$  = Total O&MN cost for year i

$R$  = Reconfiguration cost estimate \* 1.04

$M$  = Annualized Maintenance cost \* 1.04

1.04 = MSC overhead rate

$OPS_D$  = Direct contract operating cost  
calculated as follows

$OPS_D = (OPS_A) * 1.04$

where:  $OPS_A$  = MSC annual ship operating  
cost + MARAD insurance and profit

$OMN_N$  = Cost of support service provided by Navy  
calculated as:

$$(OMN_I - L - BOS) * \frac{D}{S_O} + BOS$$

where:  $OMN_I$  = Indirect Cost from  
Program Factors

$L$  = Logistics O&MN cost from Program  
Factors

$BOS$  = Base Operating Support O&MN cost  
from Program Factors

$U$  = Utilities cost as adjusted from Program  
Factors to reflect projected operating  
scenario

$E_i$  = Escalation factor for O&MN purchases for  
year i

$C$  = Total annual cost of civilian ship crew  
\* 1.04

$t$  = Length of time necessary to reconfigure/  
modify ship, in months

#### OPN

$OPN_{Ti} = OPN_D * G_i$

where:  $OPN_D$  = Direct OPN from Program Factors

$G_i$  = Escalation factor for OPN, year i

Cost estimates for the total fleet of a particular ship type are derived by multiplying each appropriation account by the number of ships operating each year.

t. The budget estimates for the FYDP years FY 79 through FY 83 are shown on Tables B-31 through B-44. Two tables are shown for ships of the AO type. One table provides FYDP estimates for the AO type ships presently manned by Navy Military personnel (and programmed to be so manned by FY 79) and requiring reconfiguration; the other displays estimates for ships presently manned by Civil Service mariners (or programmed to be so manned by FY 79) and not requiring reconfiguration.

#### C. ECONOMIC COST ANALYSES

##### 1. Navy Military Manning

a. In accordance with SECNAVINST 7000.14B,<sup>1/</sup> the economic cost of operating, maintaining, and reconfiguring (where necessary), relevant ships was projected for the fiscal years 1979 through 2008. The objective of the overall study is a comparative analysis among manning alternatives. Therefore, cost elements were ignored if they were considered to be common across all alternatives. In contrast to the previously presented FYDP cost estimates, the economic cost estimates were structured so that funds were charged to the year in which they were projected to

---

<sup>1/</sup> Office of the Secretary of the Navy, Economic Analysis and Program Evaluation for the Navy Resource Management, SECNAVINST 7000.14B, Department of the Navy, 18 June 1975

TABLE B-31

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY COMMERCIAL CONTRACT MANNING

SHIP TYPE: AF ( STORES SHIP)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - TAF-58

NAVY DIRECT MPN	=	297	BOS OFF (MAN-YR)	=	.8	BASE OPS OMN	=	141	MSC OPS (ANNUAL)	=	1,421
NAVY IND MPN	=	609	BOS ENL (MAN-YR)	=	5.8	UTILITIES	=	27	MSC MAINT (ANNUAL)	=	1,502
NAVY DET (MEN)	=	27	IND OPERATE OMN	=	1,274	DIRECT OPN	=	457	RECONFIGURE/MODIFY	=	0
SMD MANNING (MEN)	=	250	LOGISTICS OMN	=	975	MAN MANPOWER COST	=	3,091	NEW CONSTRUCTION	=	140,924
INSURANCE	=	453	CONTRACT FEE	=	73						

## ESCALATION FACTORS

FY 79	FY 80	FY 81	FY 82	FY 83
1.1231	1.1689	1.2148	1.2634	1.3129
1.1629	1.3005	1.4169	1.5449	1.6836
1.1833	1.2366	1.2862	1.3379	1.3913
1.3854	1.4742	1.5686	1.6689	1.7757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	436	436	436	436	436	2,179
OMN	6,866	7,013	7,165	7,323	7,487	35,853
OPN	541	565	588	611	636	2,941
=====	=====	=====	=====	=====	=====	=====
TOTAL	7,843	8,014	8,188	8,370	8,559	40,973

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	436	436	436	436	436	2,179
OMN	6,866	7,013	7,165	7,323	7,487	35,853
OPN	541	565	588	611	636	2,941
=====	=====	=====	=====	=====	=====	=====
TOTAL	7,843	8,014	8,188	8,370	8,559	40,973



TABLE B-32

FIVE YEAR DEFENSE PROGRAM (FYDE) - NAVY COMMERCIAL CONTRACT MANNING

SHIP TYPE: AFS ( COMBAT STORE)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AFS-3

NAVY DIRECT MPN	=	425	ECS OFF (MAN-YR)	=	.8	BASE OPS OWN	=	245	MSC OPS (ANNUAL)	=	1,289
NAVY IND MPN	=	1,219	ECS ENL (MAN-YR)	=	10.1	UTILITIES	=	114	MSC MAINT (ANNUAL)	=	1,291
NAVY DET (MEN)	=	39	IND OPERATE OWN	=	1.581	DIRECT OPN	=	120	RECONSTRUCTURE/MODIFY	=	1,760
SWD MANNING (MEN)	=	447	LOGISTICS OWN	=	1,055	MAR MANPOWER COST	=	4,366	NEW CONSTRUCTION	=	180,363
INSURANCE	=	616	CONTRACT FEE	=	.73						

ESCALATION FACTORS

OWN DUR	FY 79	FY 80	FY 81	FY 82	FY 83
CAN POL	1.1231	1.1689	1.2148	1.2634	1.3139
OPN	1.1929	1.3005	1.4169	1.5449	1.6838
SCN	1.1833	1.2366	1.2862	1.3379	1.3913
	1.3854	1.4742	1.5686	1.6689	1.7757

FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	633	633	2 1 1 <sup>1</sup>	633	633	3,374
OWN	4,303	9,167	4 6 1	9,344	9,719	42,107
OPN	620	648	674	701	729	3,372
TOTAL	5,556	10,705	10,651	10,862	11,081	48,854

FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	4,429	4,429	4,429	4,429	4,429	23,618
OWN	30,123	64,170	65,408	66,695	68,033	294,749
OPN	4,340	4,536	4,718	4,907	5,103	23,604
TOTAL	38,892	73,135	74,935	76,031	77,565	341,971

<sup>1</sup>This is the Military Detachment cost for the first operating year only for purposes of training commercial contract personnel in ship logistic cargo management.

TABLE B-33

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY COMMERCIAL CONTRACT MANNING

SHIP TYPE: AOR (Replenishment Oiler)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AOR-4

NAVY DIRECT MPN	=	353	BOS OFF (MAN YR)	=	8	BASE OPS OMN	=	245	MSC OPS (ANNUAL)	=	1,966
NAVY IND MPN	=	1,219	BOS ENL (MAN-YR)	=	10.1	UTILITIES	=	114	MSC MAINT (ANNUAL)	=	1,928
NAVY DET OMN	=	32	IND OPERATE OMN	=	1,581	DIRECT OMN	=	524	RECON-FIGURE/MODIFY	=	1,969 ( 7 MO.)
SKO MANNING (CHND)	=	447	LOGISTICS OMN	=	1,059	MAN MANPOWER COST	=	5,043	NEW CONSTRUCTION	=	180,383
INSURANCE	=	679	CONTRACT FEE	=	64						

## ESCALATION FACTORS

OWN BUR	FY 79	FY 80	FY 81	FY 82	FY 83
OWN POL	1.1231	1.1689	1.2148	1.2634	1.3139
OWN	1.1929	1.3005	1.4169	1.5449	1.6838
SCN	1.1833	1.2363	1.2862	1.3379	1.3913
	1.3854	1.4742	1.5686	1.6689	1.7757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	543	543	543	543	543	2,716
OMN	7,170	11,319	11,563	11,815	12,078	53,946
OPN	620	648	674	701	729	3,372
=====	=====	=====	=====	=====	=====	=====
TOTAL	8,334	12,511	12,780	13,060	13,350	60,034

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	3,803	3,803	3,803	3,803	3,803	19,015
OMN	50,193	79,236	80,938	82,707	84,546	377,621
OPN	4,340	4,536	4,718	4,907	5,103	23,604
=====	=====	=====	=====	=====	=====	=====
TOTAL	58,337	87,575	89,459	91,417	93,453	420,240

TABLE B-34

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY COMMERCIAL CONTRACT MANNING

SHIP TYPE: AOE (FAST COMBAT SUPPORT)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AOE-3

NAVY DIRECT MPN	=	539	BOS OFF (MAN YR)	=	1.1	BASE OPS OMN	=	331	MSC OPS (ANNUAL)	=	1,837
NAVY IND MPN	=	1,621	BOS ENL (MAN-YR)	=	13.6	UTILITIES	=	108	MSC MAINT (ANNUAL)	=	2,357
NAVY DET (MEN)	=	49	LOG OPERATE OMN	=	2,290	DIRECT OPN	=	614	RECONFIGURE/MODIFY	=	1,105 ( 9 MO.)
SKD MANNING (MEN)	=	568	LOGISTICS OMN	=	1,586	MAR MANPOWER COST	=	5,958	NEW CONSTRUCTION	=	394,388
INSURANCE	=	225	CONTRACT FEE	=	73						

## ESCALATION FACTORS

OMN PUR	FY 79	FY 80	FY 81	FY 82	FY 83
OMN POL	1.1231	1.1680	1.2148	1.2634	1.3139
OMN	1.1929	1.3095	1.4169	1.5449	1.6838
SCN	1.1833	1.2366	1.2862	1.3376	1.3913
	1.3854	1.4742	1.5686	1.6689	1.7757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	815	815	815	815	815	4,077
OMN	6,524	12,932	13,202	13,482	13,774	59,913
OPN	727	759	790	821	854	3,951
=====	=====	=====	=====	=====	=====	=====
TOTAL	8,066	14,597	14,897	15,119	15,443	67,942

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	3,262	3,262	3,262	3,262	3,262	16,310
OMN	26,094	51,729	52,808	53,929	55,094	239,654
OPN	2,906	3,037	3,159	3,286	3,417	15,805
=====	=====	=====	=====	=====	=====	=====
TOTAL	32,263	58,028	59,229	60,476	61,773	271,769

TABLE B-35

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY COMMERCIAL CONTRACT MANNING

## SHIP TYPE: AE (AMMUNITION SHIP)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AE-28

NAVY DIRECT MGN	=	455	BOS OFF (MAN YR)	=	7	BASE OPS OMN	=	293	MSC OPS (ANNUAL)	=	1,229
NAVY IND MGN	=	1,002	BOS ENL (MAN-YR)	=	8.4	UTILITIES	=	93	MSC MAINT (ANNUAL)	=	1,291
NAVY DET (MEN)	=	41	IND OPERATE OMN	=	1,373	DIRECT OPN	=	502	RECONFIGURE/MODIFY	=	930 (0 MO.)
SKD MANNING (MEN)	=	382	LOGISTICS OMN	=	949	MAR MANPOWER	=	3,557	NEW CONSTRUCTION	=	146,561
INSURANCE	=	552	CONTRACT FEE	=	73						

## ESCALATION FACTORS

OMN BUR	FY 79	FY 80	FY 81	FY 82	FY 83
OMN POL	1.1231	1.1680	1.2148	1.2634	1.3139
OPN	1.1929	1.3005	1.4169	1.5449	1.6838
SCN	1.1833	1.2366	1.2862	1.3379	1.3913
	1.3854	1.4742	1.5686	1.6689	1.7757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MGN	645	645	645	645	645	3,223
OMN	8,819	7,894	8,062	8,237	8,418	41,430
OPN	594	621	646	672	698	3,230
=====	=====	=====	=====	=====	=====	=====
TOTAL	19,058	9,159	9,352	9,553	9,761	47,883

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MGN	8,379	8,379	8,379	8,379	8,379	41,897
OMN	114,647	102,624	104,807	107,076	109,435	538,589
OPN	7,722	8,070	8,394	8,731	9,079	41,996
=====	=====	=====	=====	=====	=====	=====
TOTAL	130,749	119,073	121,580	124,186	126,893	622,482

FIVE YEAR DEFENSE PROGRAM (FYDP) -- NAVY COMMERCIAL CONTRACT MANNING

SHIP TYPE: AO (FLEET OILER)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AO-177[illegible]

		FYDP COST ESTIMATES - PER SHIP				
FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	391	391	391	391	391	1,955
OMN	4,951	7,292	7,366	7,537	7,714	33,871
OPN	336	351	365	380	395	1,828
TOTAL	4,778	7,944	8,123	8,308	8,500	37,653

FYDP COST ESTIMATES - FLEET TOTAL						
	FY 79 8	FY 80 8	FY 81 8	FY 82 8	FY 83 8	TOT/ELEMENT
SHIPS OPERATING						
MPN	3,127	3,127	3,127	3,127	3,127	15,536
QPN	32,410	57,618	58,931	60,296	61,715	270,970
OPN	2,688	2,809	2,922	3,040	3,161	14,621
TOTAL	38,225	63,555	64,981	66,463	68,003	301,227

TABLE B-37

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY COMMERCIAL CONTRACT MANNING

SHIP TYPE: TAO ( FLEET OILER)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - TAO-177

NAVY DIRECT MPN	=	209	BOS OFF (MAN YR)	=	.7	BASE OPS OMN	=	199	MSC OPS (ANNUAL)	=	1,465
NAVY IND MPN	=	977	BOS ENL (MAN-YR)	=	8.2	UTILITIES	=	224	MSC MAINT (ANNUAL)	=	1,017
NAVY DET (MEN)	=	19	IND OPERATE OMN	=	1.683	DIRECT OPN	=	284	RECONFIGURE/MODIFY	=	0
SEA MANNING (MEN)	=	183	LOGISTICS OMN	=	1.260	MAN MANPOWER COST	=	2,983	NEW CONSTRUCTION	=	152,198
INSURANCE	=	400	CONTRACT FEE	=	64						
OMN OUR		FY 79			ESCALATION FACTORS						
OMN POL		FY 80			FY 81		FY 82		FY 83		
OPN		1.1231			1.1680		1.2674		1.3139		
SCN		1.1929			1.2148		1.3449		1.6838		
		1.1833			1.4169		1.3379		1.3913		
		1.3354			1.2862		1.6689		1.7757		
					1.4742						

B-69

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	TOT/ELEMENT
=====	=====	=====	=====	=====	=====
MPN	391	391	391	391	1,955
OMN	7,045	7,202	7,366	7,537	36,865
OPN	336	351	365	380	1,828
=====	=====	=====	=====	=====	=====
TOTAL	7,772	7,944	8,123	8,308	40,647

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	TOT/ELEMENT
=====	=====	=====	=====	=====	=====
MPN	3,127	3,127	3,518	4,300	18,373
OMN	56,357	57,618	66,298	82,907	348,937
OPN	2,688	2,809	3,288	4,180	17,311
=====	=====	=====	=====	=====	=====
TOTAL	62,172	63,555	73,103	91,386	383,721



TABLE B-38

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY COMMERCIAL CONTRACT MANNING

SHIP TYPE: AD (DESTROYER TENDER)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AD-37

[illegible]

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	9,183	9,183	9,183	9,183	9,183	45,917
OMN	5,425	9,239	9,458	9,686	9,924	43,733
OPN	181	189	197	205	213	985
TOTAL	14,789	18,612	18,839	19,075	19,320	90,634

FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
	82,650	82,650	82,650	82,650	82,650	413,252
MON	48,828	83,151	85,126	87,178	89,312	393,595
CON	1,629	1,703	1,771	1,842	1,916	8,861
TOTAL	133,108	167,504	169,547	171,671	173,878	815,709

TABLE B-39

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY COMMERCIAL CONTRACT MANNING

SHIP TYPE: AS ( SUBMARINE TENDER)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - AS-36

NAVY DIRECT MPN	=	8,404	BOS OFF (MAN YR)	=	2.1	BASE OPS OMN	=	628	MSC OPS (ANNUAL)	=	993
NAVY IND MPN	=	3,095	BOS ENL (MAN YR)	=	25.8	UTILITIES	=	412	MSC MAINT (ANNUAL)	=	1,321
NAVY DET (MEN)	=	784	IND OPERATE OMN	=	2,881	DIRECT OPN	=	233	RECONFIGURE/MODIFY	=	1,358
SPD MANNING (MEN)	=	1,145	LOGISTICS OMN	=	1,546	MAR MANPOWER COST	=	3,613	NEW CONSTRUCTION	=	276,212
INSURANCE	=	488	CONTRACT FEE	=	1,773						

## ESCALATION FACTORS

OWN PUR	FY 79	FY 80	FY 81	FY 82	FY 83
OWN POL	1.1231	1.1680	1.2148	1.2634	1.3139
OWN	1.1929	1.3095	1.4169	1.5449	1.6838
SCN	1.1833	1.2366	1.2862	1.3379	1.3913
	1.3854	1.4742	1.5686	1.6689	1.7757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	10,613	10,613	10,613	10,613	10,613	53,063
OWN	4,272	9,030	9,241	9,460	9,688	41,691
OPN	299	313	325	338	352	1,628
=====	=====	=====	=====	=====	=====	=====
TOTAL	15,184	19,955	20,179	20,411	20,653	96,383

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	127,352	127,352	127,352	127,352	127,352	636,760
OWN	51,264	108,358	110,891	113,523	116,260	590,296
OPN	3,592	3,754	3,905	4,062	4,224	19,537
=====	=====	=====	=====	=====	=====	=====
TOTAL	182,208	239,465	242,148	244,937	247,836	1,156,593

FIVE YEAR DEFENSE PROGRAM (FYDP) -- NAVY COMMERCIAL CONTRACT MANNING

B-72

FYD= COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79 4	FY 80 4	FY 81 4	FY 82 4	FY 83 5	TOT/ELEMENT
	=====	=====	=====	=====	=====	=====
MPN	18,351	18,351	18,351	18,351	22,939	96,342
OMN	13,575	34,118	34,823	35,557	45,399	163,473
OPN	620	648	674	701	911	3,554
	=====	=====	=====	=====	=====	=====
TOTAL	32,546	53,116	53,848	54,609	69,249	263,369

TABLE B-41

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY COMMERCIAL CONTRACT MANNING

SHIP TYPE: ARS ( SALVAGE SHIP)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - ARS-41

NAVY DIRECT MPN	=	86	BOS OFF (MAN YR)	=	2	BASE OPS OMN	=	52	MSC OPS (ANNUAL)	=	444
NAVY IND NON	=	258	BOS ENL (MAN-YR)	=	2.1	UTILITIES	=	34	MSC MAINT (ANNUAL)	=	666
NAVY DET (MEN)	=	8	IND OPERATE OMN	=	563	DIRECT OPN	=	285	RECONFIGURE/MODIFY	=	289
SPD MANNING (MEN)	=	124	LOGISTICS OMN	=	473	MAR MANPOWER COST	=	961	NEW CONSTRUCTION	=	28,185
INSURANCE	=	96	CONTRACT FEE	=	55						

## ESCALATION FACTORS

	FY 79	FY 80	FY 81	FY 82	FY 83
OWN PUR	1.1231	1.1689	1.2148	1.2634	1.3139
OWN POL	1.1529	1.3095	1.4169	1.5449	1.6838
OWN SCN	1.1833	1.2366	1.2862	1.3379	1.3913
	1.3854	1.4742	1.5686	1.6689	1.7757

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	127	127	127	127	127	637
OWN	2,129	2,637	2,792	2,770	2,841	13,089
OPN	337	352	367	381	397	1,834
=====	=====	=====	=====	=====	=====	=====
TOTAL	2,594	3,117	3,196	3,279	3,365	15,551

## FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
MPN	764	764	764	764	764	3,822
OWN	12,776	15,821	16,214	16,623	17,048	78,481
OPN	2,023	2,115	2,199	2,288	2,379	11,094
=====	=====	=====	=====	=====	=====	=====
TOTAL	15,564	18,700	19,178	19,675	20,191	93,397

FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY COMMERCIAL CONTRACT MANNING

B-7 4

FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
=====	=====	=====	=====	=====	=====	=====
	2,759	2,759	2,759	2,759	2,759	13,795
MON						
	14,259	22,584	23,488	24,913	24,559	109,303
QMN						
	930	972	1,011	1,052	1,094	5,058
QON						
	17,948	26,714	27,258	27,824	28,411	128,155
TOTAL						

FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY COMMERCIAL CONTRACT MANNING

SHIP TYPE: ATF ( TOWING SHIP)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - ATF-166

[illegible]

## FYDP COST ESTIMATES - PER SHIP

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MPN	161	161	161	161	161	806
OMN	2,630	2,693	2,758	2,827	2,897	13,804
OPN	316	330	343	357	371	1,718
TOTAL	3,107	3,184	3,263	3,345	3,430	16,329

FYDP COST ESTIMATES - FLEET TOTAL

SHIPS OPERATING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
	7	10	11	11	11	
MON	1,129	1,612	1,774	1,774	1,774	8,062
OMN	18,407	26,926	30,341	31,092	31,872	138,638
OPN	2,212	3,302	3,778	3,929	4,086	17,306
TOTAL	21,747	31,840	35,893	36,795	37,732	164,007



TABLE B-44

## FIVE YEAR DEFENSE PROGRAM (FYDP) - NAVY COMMERCIAL CONTRACT MANNING

SHIP TYPE: ATS ( TOWING &amp; SALVAGE)

COST FACTORS - THOUSANDS OF FY-77 DOLLARS  
REPRESENTATIVE SHIP - ATS-1

[illegible]

FUNDING	FY 79	FY 80	FY 81	FY 82	FY 83	TOT/ELEMENT
MON	225	225	225	225	225	1,126
CON	2,342	3,098	3,179	3,264	3,352	15,235
CON	155	162	168	175	182	843
TOTAL	2,722	3,485	3,573	3,664	3,760	17,204

FYDP COST ESTIMATES - FLEET TOTAL						
	FY 79 =====	FY 80 =====	FY 81 =====	FY 82 =====	FY 83 =====	TOT/ELEMENT =====
SHIPS OPERATING =====						
MPN	676	676	676	676	676	3,379
OMN	7,026	9,293	9,537	9,792	10,056	45,704
OPN =====	465	486	505	526	547	2,529
TOTAL	8,167	10,455	10,719	10,993	11,279	51,613

be expended not in the year in which they were expected to be budgeted.

b. Two points of view may be taken in performing an economic cost analysis. There is a difference between the economic cost to the DOD and the economic cost to the Federal Government. Namely, the economic cost to the Government includes the foregone taxes associated with clothing, food, quarters, and other allowances which are non-taxable. Therefore, both a DOD and a Government economic cost estimate were prepared.

c. All costs were estimated in constant FY 77 dollars. Both discounted and undiscounted dollars are presented. The assumption was made that the same number of active ships of each type is required each year regardless of the manning concept employed, even though it appears that civilian manning would result in an increased number of productive days per year for some types of ships. War preparedness is the motivation behind this assumption. Thus, to normalize the cost estimates to a measure of effectiveness, they are also presented on a productive day basis as well as an annual basis. The average annual cost is based on the years in which a ship (and its replacement, if any) is operational. In the case of AD, AS, and AR (tender and repair type) ships, productive days were taken to be days in port. For all other ship types, productive days were assumed to be steaming days. Costs were computed

by hull number so that decision may be made on an individual ship basis.

The cost breakdown structure utilized by this study is shown below. It is complete and compatible with the civilian manning alternatives.

RECONFIGURATION

OPERATIONS

REPAIR PARTS

FUEL

UTILITIES

OTHER

MAINTENANCE

RA/TA (Restricted Availability/Technical  
Availability)

SELECTED RA

IMA (Intermediate Maintenance Activities)

OVERHAUL

PERSONNEL

NAVY CREW

BILLET COST

FOREGONE TAXES

d. All cost elements considered irrelevant to the study due to their invariance across alternatives were excluded from consideration where possible. These include construction of new or replacement ships, FMP (Fleet Modernization Program) installation, and base operating support

(O&MN). Logistics support (indirect O&MN) was included. This cost is also incurred by MSC and is accounted for as part of their overhead charges.

e. It was considered desirable to restrict attention to hulls which (together with their respective replacements) would be in continual operation for approximately thirty years within the 1979-2008 period. It was found that no ships are projected in the FYDP<sup>1/</sup> to be retired between FY 79 and FY 81 without replacement. The only new construction assumed in addition to that projected by the FYDP was based on the EPA (Extended Planning Annex).<sup>2/</sup>

f. A forty year life was assumed for those ships not programmed for retirement within the combined FYDP/EPA time period. All such ships which would retire prior to 2008 were assumed to be replaced by a new ship of similar construction the following year.

g. The analysis was performed in order to estimate the relevant cost elements for the Navy military manning alternative. All ships were assumed to be manned entirely by Navy military crews.

h. In the case of Navy manning, no reconfiguration is required, so this cost element was set to zero.

---

<sup>1/</sup> See Footnote <sup>1/</sup> P. B-10

<sup>2/</sup> OPNAV-965, Extended Planning Annex--FY 83 to FY 92 (SECRET), Department of the Navy, December 6, 1976

i. The annual cost of operations was taken for each ship of a type from the July 1976 Navy Program Factors Manual<sup>1/</sup> for the representative class of that type. As explained above, the only indirect operating cost included was logistics support. The costs for the classes selected as representative were utilized for all ships of a type. The annual costs of fuel and shore utilities per ship were adjusted to reflect the differences between the operating scenario for civilian manning of each type (Navy Civil Service and Commercial Contract) and that shown for each ship class by the Program Factors.

j. The annual cost of maintenance excluding overhaul was taken from the Program Factors. The unit overhaul cost shown in the Factors was accounted for in the years in which overhauls were projected to occur, as opposed to using the average annual cost.<sup>2/</sup> If an overhaul was scheduled to occur in the year prior to (or the year of) decommissioning, it was ignored as unnecessary.

k. The cost of personnel in the Navy military manning alternative was estimated as follows. The average billet costs by pay grade were applied to the number of personnel of each pay grade obtained from SMDs (Ship Manning Documents) as described in Appendix A. The indirect O&MN

---

<sup>1/</sup> See Footnote <sup>1/</sup> on P. B-2

<sup>2/</sup> Chief of Naval Operations, Pacific and Atlantic Fleet Overhaul Schedules, FY 1976-1982, OPNAVNOTE 4710, Department of the Navy, 7 September 1976

and MPN costs for PCS, TAD, recruiting and examining, health, and training are proportional to the number of Navy crew members employed. Thus, these costs are not invariant across manning alternatives. These cost elements are included in the billet cost of each crew member and therefore are not separately accounted for elsewhere.

1. Due to the fact that Federal Income Tax is not applied to allowances, the taxes thus foregone were considered to be a cost incurred by the Government for Navy Military personnel. Foregone taxes were estimated by determining for each enlisted and officer pay grade, from the Federal Withholding Tax tables, the tax rate (i.e., percentage) applicable to the composite rate for that grade. The tax rate established for each pay grade was applied to the allowances portion of the composite cost for that pay grade. The resultant foregone taxes by pay grade were then weighted by the number of personnel of each pay grade on each type of ship. In establishing these tax rates BUPERS suggested assuming 3 exemptions for officers and 2 for enlisted personnel. All personnel were assumed to be married.

m. The cost of civilian personnel does not apply to the Navy manning alternative. Hence, this cost element was set to zero.

n. The economic cost estimates resulting from this analysis are provided in Tables J-1 through J-2 of Volume IV. In accordance with OPNAV Instruction 5510.14, Change



Transmittal Two dated 18 May 1977, these data are classified and are therefore included in the classified Appendix J, Volume IV. The tables display undiscounted costs and discounted costs, respectively.

## 2. Navy Civil Service Manning

a. The following paragraphs present the methodology applied to the estimation of each life cycle cost element of the cost breakdown structure for the Navy Civil Service manning alternative.

b. It was assumed that, for cost-effectiveness, all ships programmed according to the FYDP for decommissioning in fiscal years 1979, 1980, and 1981 will not be considered potential candidates for civilian manning. For these ships, a zero value was assigned to reconfiguration cost.

c. A forty year life was assumed for all ships not programmed for retirement according to the FYDP or Extended Planning Annex. Accordingly, all ships programmed for reconfiguration in fiscal years 1979, 1980, and 1981, or projected to be replaced after 1981 and prior to 2008, were treated as though reconfiguration would be performed in FY 79. One exception was made. Those ships budgeted prior to FY 79 for construction to military habitability standards, and scheduled to be operational after FY 79, were assumed to be reconfigured in the year prior to their scheduled entry into fleet operation. This includes the AO-177 and AO-178.

d. The unit reconfiguration cost was obtained from MSC, as was the duration of reconfiguration for each type of ship. The latter was used to estimate the pro-rata portion of annual operating and personnel costs which should be assigned in the year of reconfiguration (FY 79). A 5% overhead charge was added to MSC's cost estimates to arrive at the actual cost to the Navy.

e. In those years in which a ship is Navy military manned, its operations costs were estimated in a manner identical to that described for the military manning alternative. The following operations cost estimate was applied to those ship years in which a Navy Civil Service crew is to be employed; that is, all years of operation after reconfiguration or new construction. Excluded are those years prior to retirement for those ships not to be reconfigured.

f. The annual cost of operations was provided by MSC for each ship type. Added to their operations estimate is a 5% overhead charge reflecting, among other indirect expenses, the cost of logistics support.

g. The cost of shore utilities was added to this estimate. The estimate of this element was taken from the July 1976 Navy Program Factors Manual (NPFM) and adjusted to reflect the difference between the number of days in port projected for each Navy Civil Service manned ship, and that shown for its representative ship class by the NPFM.

h. The annual cost of maintenance was provided by MSC, and was applied to those ship years in which a Navy Civil Service crew is to be employed. Overhaul costs were time-phased according to the MSC overhaul cycle. A 5% overhead charge was added to MSC's estimates of these costs to arrive at the projected cost to the Navy. The annual cost of maintenance applied during the period of Navy military manning was taken from the NPFM. In this case, overhaul costs were time-phased according to the Navy overhaul cycle.

i. The Navy detachment portion of this cost was computed by applying the average billet costs by pay grade to the number of personnel of each pay grade. The indirect costs of PCS, TAD, recruit and examining, health, and training are not applicable to civil servants but are included in the billet costs for Navy military personnel.

j. Foregone taxes were computed as described previously by pay grade, and were applied to the Navy military detachment personnel.

k. The economic cost estimates resulting from this analysis are provided in Tables J-4 and J-5. Table J-6 shows the 30 year life cycle detail for a sample ship. These tables appear in Volume IV (Classified Appendix).

### 3. Commercial Contract Manning

a. The methodology applied to estimate the economic cost of the above option is similar to that used for the

Navy Civil Service case. Costs were again projected for fiscal years 1979 through 2008. The cost elements selected for consideration are, for consistency, those described in the Navy Civil Service alternative. The cost breakdown structure shown on Page B-77 therefore also applies here.

b. It was assumed that, for cost-effectiveness, all ships programmed according to the FYDP for decommissioning in fiscal years 1979, 1980, and 1981 will not be reconfigured for civilian habitability and would continue to be manned by Navy military personnel until retired. For these ships, a zero value was assigned to reconfiguration cost.

c. A forty year life was assumed for all ships not programmed for retirement according to the FYDP or Extended Planning Annex. Accordingly, all ships programmed for reconfiguration in fiscal years 1979, 1980, and 1981, or projected to be replaced after 1981 and prior to 2008, were treated as though reconfiguration would be performed in FY 79. One exception was made. Those ships budgeted prior to FY 79 for construction to military habitability standards, and scheduled to be operational after FY 79, were assumed to be reconfigured in the year prior to their scheduled entry into fleet operation. This includes the AO-177 and AO-178.

d. The unit reconfiguration cost was obtained from MARAD. The latter was used to estimate the pro-rata

portion of annual operating and personnel costs which should be assigned in the year of reconfiguration (FY 79). A 4% overhead charge, which was estimated by MSC for the administration of the contract, was added to MARAD's cost estimates to arrive at the actual cost to the Navy.

e. In those years in which a ship is Navy military manned, its operations costs were estimated in a manner identical to that described for the military manning alternative. The following operations cost estimate was applied to those ship years in which a commercial contract crew is to be employed; that is, all years of operation after reconfiguration or new construction. Excluded are those years prior to retirement for those ships not to be reconfigured. MSC costs for the annual cost of operations, excluding insurance and contract fee, for each ship type was used. Additionally, there are two cost elements unique to contract manning, i.e., P&I (Personal and Indemnity) insurance and administrative fee paid to the contractor. The insurance costs were provided by MARAD on a per person basis to reach ship type, including premiums and costs for claims under the deductible. These were multiplied by the number of contract crew personnel aboard each type of ship to provide an estimate of annual insurance cost per ship. The fee was estimated by MARAD on a per ship-day basis for each type ship. This was multiplied by 365 to provide an estimate of annual fee per ship. Added to these operations

estimates is a 4% MSC overhead charge reflecting, among other indirect expenses, the cost of contract administration as mentioned earlier.

f. The cost of shore utilities was added to this estimate. The estimate of this element was taken from the July 1976 NPFM and adjusted to reflect the difference between the number of days in port projected for each contract manned ship, and that shown for its representative ship class by the NPFM.

g. MSC's annual cost of maintenance was used, and was applied to those ship years in which a Commercial Contract crew is to be employed. Overhaul costs were time-phased according to the MSC overhaul cycle. A 4% overhead charge was added to MSC's estimates of these costs to arrive at the actual cost to the Navy. The annual cost of maintenance applied during the period of Navy military manning was taken from the NPFM. In this case, overhaul costs were time-phased according to the Navy overhaul cycle. The Navy detachment portion of this cost was computed by applying the average billet costs by pay grade to the number of personnel of each pay grade. The indirect costs of PCS, TAD, recruiting and examining, health, and training are not applicable to Commercial Contract mariners but are included in the billet costs for Navy military personnel.

h. Foregone taxes were computed by pay grade, for Navy military personnel.



i. The economic cost estimates resulting from this analysis are provided in Tables J-7 and J-8 of Appendix J. Table J-9 shows the 30 year life cycle detail for a sample ship. Tables J-7 through J-9 appear in Volume IV (Classified Appendices).



## APPENDIX C

### FLEET SUPPORT POLICIES ANALYSIS

#### A. GENERAL

1. The operating forces perceive that changes in fleet support policies could result from the increased use of civilian manning to replace Navy military crews in fleet support ships. The purpose of this chapter is to identify those areas where civilian manned fleet support ship operations will affect changes to existing policies and practices followed by the fleet and subordinate commanders.

2. The Commanders Surface Forces, subordinate commands of both FLTCINCs, are responsible for the administration and management of the fleet support ship forces. These responsibilities entail personnel, material and training readiness. Fleet support ships are allocated to the numbered fleet commanders for operational control; these fleet commanders employ them in support of the combat forces.

3. A decision was made by the CNO in the early seventies (Charger Log II) to transfer selected fleet support ships to MSC for designation as USNS ships and for Navy Civil Service manning. The administration and management of civilian manned fleet support ships became the responsibility of the MSC and for these ships, the Commander, Military Sealift Command, assumed the functions formerly carried out by the Commanders, Service Forces.

4. COMSC recruits, trains, and allocates Civil Service mariners to its fleet support ship force. COMSC has also assumed the full responsibility for the maintenance and overhaul of the civilian manned fleet support ships that are allocated to the FLTCINCs and subordinate commanders to conform to an agreed schedule of services and deployments. The administration and management remains in the hands of COMSC; Operational Control (OPCON) passes back and forth between the FLTCINCs and COMSC as the ships are made available for services, or revert to COMSC for programmed maintenance or other reasons.

5. MSC is currently engaged in fleet support ship operations with ex-USS ships crewed by Navy Civil Service mariners. Should a decision be made to contract with the commercial maritime industry to operate ex-USS fleet support ships, MSC, as cognizant Department of Defense Transportation Operating Agency (TAO) for ocean shipping, would be the authorized contracting and management agency for these expanded services. The MSC is commanded by a Navy Rear Admiral and staffed with both Navy military and civilian shipping experts. It is a participant in the Naval Communications worldwide network.

#### B. COMMUNICATIONS CAPABILITIES

1. U.S. Navy Fleet and subordinate commanders exercise command and control of fleet units through a high capacity, secure communications system.

2. Civilian manned fleet support ships are required to retain a full communications capability. No reductions in the installed communication systems in ships transferred from the Navy military manning to civilian manning are planned. Communication personnel are required to have SECRET clearances to carry out message center functions, and TOP SECRET for crypto access and repair. Civilian radio officers must have these levels of security clearances before gaining access to naval communications spaces.

3. A civilian manned fleet support ship will be required to perform the following functions over a 24 hour day:

- Provide command and control communication facilities to support a naval task organization's commanders and their staffs when embarked.
- Maintain visual communications
- Maintain uncovered Radio Teletype Continuous Wave (RATT/CW) communications
- Maintains multichannel cryptographically covered RATT/CW communications
- Process communications message traffic
- Carry out organizational level maintenance on installed communication equipments

The volume and coverage of naval communications will vary depending upon the ship's mission and tasks.

4. The Combat Stores Ship (AFS) has one of the heaviest communication loads in the MLSF. It receives lengthy, coded logistic requirements messages from the ships to be supported. These messages must be processed and delivered to the ship's underway replenishment materials handling center. The message traffic is heaviest preparatory to and during underway replenishment operations with a task force organization. In addition to logistic message traffic, the AFS, like all UNREP ships, transmits to and receives messages from the task organization being supported on such events as positions, courses and speeds, rendezvous points for future operations, weather, changes to operation orders and plans, etc.

5. The Fast Combat Support Ship (AOE) and Underway Replenishment Ship (AOR), operating in direct support of aircraft carrier task forces, have a communication load that occasionally matches that of the AFS.

6. In peacetime, the Ammunition Ship (AE) transfers ammunition for training. Related message traffic is light. However, in wartime its logistic message traffic is almost as heavy and complex as the AFS because of customer ship demands for many kinds of bombs, missiles and components used in combat operations.

7. The fleet oiler (AO) engages in more frequent UNREPs than the AFS and AE, and resupplies the AOE and AOR, as well as combat fleet units. Its communication load mainly involves fleet operations, with less emphasis on cargo



handling. Some message traffic may be generated in connection with fleet freight and passengers sometimes carried by fleet oilers.

8. Tenders and repair ships experience a heavy communication load while providing in-port repair services to ships alongside. They take the communication guard and process message traffic for ships being supported. U.S. based tenders and repair ships tie into land lines for their communication network. When at sea and forward deployed in the theater of naval operations overseas, regular radio channels are maintained.

9. Towing, salvage, and rescue ships are smaller ships that do not engage in extensive communications except during salvage and rescue operations. During these special operations, communications are heavy because of the interest generated by the nature of a salvage or rescue operation. The small size of towing, salvage or rescue ships limits the communication equipment that is installed and the numbers of personnel to operate and maintain it.

10. When fleet support ships operate in company, the Navy may install a task force organization commander and staff on board one of the fleet support ships suitably configured to accommodate the additional personnel. The existing communication facility must be capable of supporting the additional communications load imposed by the command and control of multi-ship task organizations.

11. Mission areas, task assignments, installed equipment, communication space allocation and arrangement are all factors that determine the manning level in fleet support ships. According to the Navy, the minimum number of communication personnel aboard a major fleet support ship is:

- 1 Supervisor (classified material custodian)  
on call 24 hours
- 6 Watchstanders (Signalmen/Radiomen) a  
section watch
- 2 Repairmen, on call

These are minimum requirements. Augmentation may be required when the tempo of operations increases. When visual communication watches are not continuous, signalmen may be placed on call or used to assist the watch radiomen on message center duties.

12. On the ships manned by Navy Civil Service crews, the communication departments are manned by a naval communication detachment. The naval detachment is headed by an officer-in-charge who is assisted by enlisted radiomen and signalmen in providing the ship with a full naval communication capability.

13. The officer-in-charge is a surface warfare specialist and the custodian of all classified matter and materials. His duties consist of administering the communication detachment, and advising and assisting the ship's

Master in understanding naval plans and operations as they relate to his ship, tactical maneuvers, and other naval oriented operations.

14. It must be noted that duty for military detachments embarked on civilian manned ships represents an entirely different life style than that experienced on USS ships. Navy personnel, except those assigned to tenders and repair ships, will share the same habitability standards afforded the civilian crewmen. Differences in pay scales, especially during periods of arduous duties, between civilian and naval seamen working side-by-side may be a distraction for some. The officers and enlisted men selected for this duty must be carefully screened for this duty.

C. DEFENSE CAPABILITIES

1. In the reconfiguration of fleet support ships, all defense systems are removed. Therefore, plans for civilian manned ship deployment in war or a hostile environment should require provisions for naval escort and/or provisions for the addition of modular defensive weapon systems.

D. MAINTENANCE

1. The responsibility for the maintenance, repair, and overhaul of civilian manned fleet support ships rests with the Military Sealift Command for Civil Service operated ships. Both MSC and contract operators use commercial facilities. MSC has access to Navy repair and shipyard facilities, but seldom relies upon these activities for

routine repairs.

2. Fleet support ships operate worldwide in support of deployed combatant forces. Navy military manned fleet support ships with maintenance problems are served by Navy tenders, repair ships, and repair bases. The MSC has offices established in many major foreign ports and at oversea bases to assist MSC Civil Service manned ships with crew repatriation, personnel and maintenance problems. The MSC contract operated ships rely upon local agents to handle their support.

3. Where fleet support ships are more likely to be operating from and near military installations, local agents may not be available. Assistance by MSC and the military for contract operated fleet support would be appropriate. The MSC has estimated a 4% fee for managing the proposed contract operation vice a 5% overhead to fund its own ship operations. It appears that this 4% fee would compensate MSC for all services rendered to its contractors in this instance. It should be noted here that all cost analyses for commercial contract manning in this report have included this surcharge.

4. Following merchant marine practice, MSC and contract operators require all shipboard maintenance to be performed by the embarked crew. Maintenance is conducted at sea, as well as in port. Corrective maintenance is performed immediately. Should the corrective maintenance require

outside assistance, it is deferred until a break in the schedule will enable the ship to visit a repair activity or to be taken "off hire" until the repairs are completed. Approximately once in two years, the ship is drydocked for hull cleaning and overhaul of propellers, shafting, sea chest, etc. U.S. Coast Guard and classification society (ABS) inspections may also be scheduled at this time.

#### E. TRAINING

1. MSC has developed a comprehensive training program for its personnel who operate in fleet support ships. Training is given in three phases and is geared to schedules for activation of ships assigned. Initially, training is provided by Navy activities in ship handling and technical aspects of the intended operation, such as firefighting and damage control. Civil Service seamen are also assigned to sail as observers aboard Navy ships. In the second phase, when the crew is assigned to the ship, they are involved in training operations at sea under the observation of skilled Navy instructors. Finally, during ship qualification trials, the ships take part in underway exercises where the crew handles all functions which would be performed in an actual operation, again observed by skilled Navy instructors. Throughout all training, maximum utilization is made of MSC facilities and instructors, plus the facilities available in the Navy Training Commands.

2. While MSC might be capable of training more seamen aboard MSC ships, there is still a requirement to use Navy shore training facilities; i.e, ship handling trainers, fire fighting and damage control schools, etc. Training by MSC in areas/skills at Navy training facilities already in existence does appear to be cost effective. Moreover, the services of the Navy's Fleet Training Groups (FTG) will be required to continue training MSC ships and crews, and to evaluate the performance on contract operated fleet support ships, if this option is exercised by naval planners.

3. MARAD advises that contract operators are prepared to establish training courses at the industry/union supported training facilities for licensed and unlicensed personnel. In the beginning, the use of Navy instructors would be helpful at these schools. Visits to USS fleet support ships to observe fleet support operations would be helpful to the indoctrination and training of civilian contract personnel. The FTG should be available to evaluate the crew and ship prior to assignment to fleet support operations.

#### F. DEPLOYMENT CYCLES

1. The current peacetime posture of the U.S. Navy is to maintain two Carrier Task Groups (CTG) in the Mediterranean theater and two CTGs in the Western Pacific. Fleet support ships are stationed in these forward areas to meet peacetime logistics requirements and to provide a surge capability for a national emergency or war. Combatant and support ship



forces with Navy military crews, are rotated between the United States and forward areas to allow crewmen to spend time in their homeports, and to provide scheduled overhaul at CONUS facilities. Currently Civil Service manned TAOs deploy from one to three years. Crews are repatriated at roughly yearly intervals.

G. NAVY MILITARY PERSONNEL

1. One of the possible benefits that can be derived from the expanded implementation of the civilian manning concept is the reduction in the number of military personnel currently required for support ship operations. Increased civilian manning of support ships would release skilled ratings for reassignment to the combatant forces. However, as civilians replace naval personnel, the authorized end strength of the Navy would probably be reduced.

2. The number of Navy military personnel who would be released for reassignment as a result of expansion of the civilian manning concept across the current fleet support ship force is the difference between current military manning levels and the number of military personnel required to man military detachments. Table C-1 shows the total SMD authorized manning levels of the active support fleet by ship type. It also shows the number of personnel required to man military detachments if this force would be completely manned under the Navy Civil service or Commercial

TABLE C-1 CHANGE IN NAVY BILLET REQUIREMENTS

MISSION AREA		SHIP TYPE	BILLET REQUIREMENTS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
			NAVY MILITARY MANNING					MILITARY DETACHMENT, NAVY CIVIL SERVICE MANNING					Δ					MILITARY DETACHMENT, COMMERCIAL CONTRACT MANNING					Δ																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
			O	W.O.	E	TOTAL	O	W.O.	E	TOTAL	O	W.O.	E	TOTAL	O	W.O.	E	TOTAL	O	W.O.	E	TOTAL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
UNREP																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								

O = OFFICER PERSONAL  
W.O. = WARRANT OFFICER PERSONAL  
E = ENLISTED PERSONAL

Contract manning alternatives. The delta columns show the numbers of military personnel that would be reassigned if the civilian manning alternatives were utilized to man the active support fleet.

#### H. NEW CIVILIAN JOBS CREATED

1. Expansion of the civilian manning concept across the entire active support force would create a large number of new civilian billets. In the case of the Navy Civil Service manning alternative, these new billets would be created in the government sector. In the case of the Commercial Contract manning alternative, these billets would be created in the private sector. For either alternative, the most likely source of personnel to fill these billets would be the manpower pool represented by the maritime union hiring halls. Table C-2 shows the number of new civilian billets which would be required to be filled under each of the civilian manning alternatives for operation of the support fleet. Also shown are the number of personnel required to fill these billets.

2. In the Navy Civil Service manning case, the number of billets has been multiplied by a factor of 1.2 to arrive at total personnel requirements. This factor represents the 20% additional personnel over actual billets maintained by MSC to cover vacations, illnesses, training and other personnel down time.

3. In the Commercial Contract manning case, the number

TABLE C-2

CIVILIAN BILLETS AND PERSONNEL REQUIRED  
TO MAN THE ACTIVE SUPPORT FLEET

TYPE SHIP	NAVY CIVIL SERVICE MANNING						COMMERCIAL CONTRACT MANNING					
	LICENSED		UNLICENSED		TOTAL		LICENSED		UNLICENSED		TOTAL	
	BILLETS	PERSONNEL	BILLETS	PERSONNEL	BILLETS	PERSONNEL	BILLETS	PERSONNEL	BILLETS	PERSONNEL	BILLETS	PERSONNEL
UNREP	708	850	4,718	5,662	5,426	6,512	811	1,784	4,894	10,767	5,705	12,551
REPAIR	316	379	3,359	4,031	3,675	4,410	433	953	2,565	5,643	2,998	6,596
SERVICE	178	214	540	648	718	862	200	440	458	1,008	658	1,448
ALL	1,202	1,443	8,617	10,341	9,819	11,784	1,444	3,177	7,917	17,418	9,361	20,595

of billets has been multiplied by a factor of 2.2 to arrive at total personnel requirements. This factor represents the fact that, under current practices, the average tour of union personnel aboard a ship is six months. Thus, two seamen are required to man each billet for one year. The remaining portion of this factor (two-tenths) represents the additional manpower required to cover personnel down time.

4. Any transition to civilian manning should be effected in stages such as to avoid numbers and training shortfalls. As mentioned earlier, transfer of all these positions should not occur at one time and thus, little shortage of personnel is envisioned.

## APPENDIX D

### OPERATIONAL RISKS

#### A. INTRODUCTION

1. The purpose of this section is to assess the factors that constitute potential risk to the effectiveness of the Navy's mobile logistic and support forces, as the result of increased use of civilian manned fleet support ships.

2. The analysis addresses the following areas of concern to naval planners:

- Military Control
- Stability of the Civilian Work Force
- Manpower Availability
- Legal Implications
- Navy Career Management Implications
- Ship Habitability Impact
- Endurance

#### B. MILITARY CONTROL <sup>1/</sup>

1. The U.S. Navy exercises control over its sea-based forces through fleet and subordinate commanders of Naval task forces, groups, and units. The authority to control commissioned ships and Naval crews is derived from U.S.

---

<sup>1/</sup>The legal aspects of U.S. Government jurisdiction and disciplinary control over Civil Service and Merchant seamen in peacetime and wartime are more fully discussed in Appendix G.



Navy Regulations, Department and Fleet Directives. Discipline is governed by the Uniform Code of Military Justice (UCMJ).

2. The status of fleet support ships changes when Navy Civil Service crews are substituted for Naval Military crews. Commissioned (USS) ships thus manned are redesignated "active status, in service" and are called "United States Naval Ship" (USNS). With this new status, the administrative chain of command passes from the Fleet Commanders to the Commander, Military Sealift Command (COMSC) who acts for the Chief of Naval Operations in sealift matters. Operational control of USNS fleet support ships remains with the Fleet Commander and his subordinate operational commanders.

3. The Civil Service master of a USNS ship operating in support of the fleet is subject to the orders, regulations, and policies of COMSC, and the MSC area commander having direct administrative control of the ship. Failure of the Civil Service master to comply with such direction can result in disciplinary proceedings under applicable Civil Service personnel regulations.

4. In peacetime, Navy Civil Service mariners, employees of the U.S. Government, are subject to Civil Service Commission regulations and the orders, regulations, and policies of the MSC. The master of a Civil Service manned

fleet support ship has the authority to regulate and discipline members of his crew for specific failures to perform their duties in a satisfactory manner. Navy Civil Service mariners, ashore and afloat, are subject to disciplinary action for violations of MSC orders, regulations, and policies. This is set forth in Civilian Marine Personnel Instruction (CMPI) 750.

5. All USNS ships are issued Ship's Orders which apply to all Civil Service personnel serving aboard. Numerous articles deal with responsibilities, performance of duty, conduct ashore and afloat, and prohibitions. Failure to comply subjects the offender to disciplinary action appropriate for the offense under the charge "failure to comply with the Ship's Orders".

6. COMSC has limited disciplinary control over the master and crew of a contract-operated ship. In disciplinary cases, MSC must take action through the contractor. However, in wartime, court martial jurisdiction and the entire UCMJ is extended to civilian personnel, by the imposition of 10 U.S.C. Sec 802. A merchant seaman who is referred by his union to crew a fleet support ship for a commercial contractor must sign the "Ship's Articles", whereby he agrees to work on the ship for a specific voyage, or a specified time, at a certain salary. Ship's articles govern the conduct of

both master and seaman aboard ship and derive their authority from Title 46 U.S. Code, "Shipping". While the intent is to protect the rights of U.S. seamen aboard ships, it has also the force of "Ship's Orders" in describing regulations and prohibitions to which all must adhere for safe and proper operation of the ship. When his voyage is over, the seaman signs off the ship. His working rules, his tenure of employment, and his benefits are determined by negotiations between his union and the shipping company.

7. Shipboard discipline measures are addressed in union agreements with contracted companies. These agreements enjoin union members to obey the lawful orders of the ship's master and all supervisory personnel. They also normally provide for the right to appeal disciplinary actions or disagreements between the ship's officers, unlicensed seamen, and the master to a board composed of company and union officials. Since union agreements state that hiring halls must furnish competent, reliable seamen to the contracted ship, the unions police their ranks to rid themselves of seamen who have a history of misconduct or incompetence. The Commandant, U.S. Coast Guard has statutory authority to take punitive and remedial action against licensed officers and certificated seamen for incompetency and misconduct.

8. As in the case of Civil Service manned ships, the maritime record of the U.S. Maritime Service has been outstanding. In WW II, 5625 U.S. Merchant Seamen lost their lives. Of these, 4780 were never accounted for. The U.S. Maritime Service's percentage of battle deaths, of those who served, was (2.8%), second only to the U.S. Marine Corps (2.9%).

9. Military and Civilian Personnel Compatibility.

a. During WW II, Naval detachments were placed on board merchant vessels to man the defensive weapon systems. There is no evidence that during this era either military personnel or civilian seamen attempted to interface with the work of the other. COMSC advises that today both groups are working and living harmoniously together aboard USNS ships, sharing the same accommodations and food.

b. On repair ships and tenders with large military detachments, however, there are differences in accommodations. Navy crewmen consider a ship to be their permanent home. The disproportionate allocation of living and messing spaces to a small civilian ship operating crew and a large repair force crew could result in a possible morale problem.

C. STABILITY OF THE CIVILIAN WORK FORCE

1. The functions performed by crew members aboard

the Navy's fleet support ships, and especially the ships in the MLSF,<sup>1/</sup> require experience and expertise. Military Sealift Command manpower planners manage the careers of their marine employees through recruitment, training, and assignments to ships. Navy Civil Service mariners are sent to ships to fill billets for which they are trained and best fitted. Stability on MSC ships is attained by establishing appropriate sea tour lengths, returning seamen to the same or similar type of ships, and providing trained reliefs. Because the MSC mariner is a permanent employee and not a voyage employee, manpower stability and desired performance are attainable on MSC Navy Civil Service manned ships.

2. Commercial Contract manned ships depend upon manning agreements with the maritime unions for manpower. Union hiring hall dispatchers are concerned with crew stability on ships, however, the union's primary goal is to employ its membership. When job opportunities are plentiful, crews would be stable. However, the decline in U.S.-flag merchant shipping has created a job shortage, thereby causing frequent rotation of seamen in an effort to give each union man at least some employment. Union personnel agree that this rotation would provide the Navy a large trained pool of manpower. Thus, the lack of "stability"

---

<sup>1/</sup>Mobile Logistic Support Force

would not be a negative factor.

D. MANPOWER AVAILABILITY

1. The U.S. Maritime seagoing labor force employs an average of 2.2<sup>1/</sup> seamen to fill each billet aboard U.S.-flag merchant ships. There are presently approximately 24,000 sea billets, providing employment opportunities for approximately 55,000 seamen. Only in the engineering ranks have any shortages appeared, according to COMSC.

2. This labor force is composed of relatively older workers when compared to the Navy. In 1974 the median age of licensed deck and engine officers was 48.5 and 48.7 years, respectively. Comparable figures for unlicensed deck and engine workers were 46.6 and 47.4 years. The median age has remained stable for several years because of a supply of younger men entering the labor force. However, the lack of employment opportunities due to a continuous decline in sea-going jobs is the reason why these young men do not have a greater impact upon the median age distribution. U.S. Maritime Administration (MARAD) has ongoing studies which analyze the future merchant marine officer supply and demand. The

---

1/ Oversight Hearings of the Subcommittee on Merchant Marine, Committee on Merchant Marine and Fisheries, with Respect to the U.S. Flag Merchant Marine, Report Ser No 94-M, 94th Congress, 2nd Session, U.S. Govt. Printing Office (1977).



latest study<sup>1/</sup> shows a shortage of deck and engine officers by 1980.

3. MARAD manpower planners place more concern on the possible shortage of deck and engine licensed officers than unlicensed seamen. Licensed officers are the technical experts aboard merchant ships. The skills to qualify for promotion are achieved after formal education, self-study, experience and time aboard ships. They must pass a comprehensive written examination given by the U.S. Coast Guard before they can be licensed and promoted.

4. Because ship planning and construction requires several years to put a ship to sea, MARAD sources state that manpower resources can be programmed and trained to meet new ship requirements. Many of the current supply of deck and engine officers are licensed Masters and First Officers, or Chief and First Engineers but occupy lesser billets. As the fleet expands, shortages may occur at the officer entry level. Present positions must be filled by greater training school outputs and the upward shift of personnel. The U.S. Coast Guard has provided relief in the past by allowing otherwise qualified unlicensed personnel to waive time requirements to advance to Third Officer positions. Also, the Federal,

---

<sup>1/</sup> Merchant Marine Officer Training, 3rd Series, (Draft) Office of Maritime Manpower, U.S. Maritime Administration, undated.

state, and industry supported officer training schools are capable of increasing output to meet demand.

5. The sources to fill unlicensed jobs in an expanding fleet are not easily identified. Certification at the entry level is sufficient to fill billets requiring only basic skills. A rapidly expanding fleet would require expansion of U.S. Government and industry supported training schools. MARAD reports that applications for admittance exceed the numbers that can be admitted. However, union leaders are sensitive to changes in the job market. Since many of the ships to be employed will have to be reconfigured in U.S. shipyards, the lag of contracting and construction will provide enough time to allow an orderly, phased expansion of the merchant marine labor force. The ship reconfiguration schedule should allow an orderly phased program of personnel procurement, training and assignment.

6. Potential draw-downs of the number of merchant seamen in the seagoing labor force are:

a. The National Defense Reserve Fleet (NDRF) presently consists of 130 WW II vintage VICTORY ships and SEATRAN class vessels. In a national emergency these ships can be reactivated and put into service in 1 to 3 months. Manpower requirements to man these ships are approximately

1400 licensed officers and 3300 unlicensed seamen.<sup>1/</sup> A temporary disruption in union hiring hall priorities in order to provide the needed manpower to reactivate NDRF ships is a possibility.

b. The increased need to employ U.S.-flag tankers to transport Alaska oil to the U.S. West Coast is a new requirement (approximately 10 large tankers). Should it become necessary to transport oil to the Gulf Coast of the U.S. via the Panama Canal, a considerable fleet of new tankers would draw upon available manpower resources.

7. The Military Sealift Command is the largest employer of civilian mariners within the U.S. Government. Inputs to the ranks of the Civil Service mariners are accepted from merchant seamen and discharged naval personnel. MSC actively recruits former Navy personnel with fleet ship experience. MSC assists former Navy men to obtain U.S. Coast Guard certification at entry levels commensurate with the highest grade achieved during naval service.

8. In April 1977, MSC Civil Service manned ships employed 602 licensed officers and 1919 unlicensed seamen aboard ships providing services to the Department of Defense.

---

<sup>1/</sup>The ratio of unlicensed seamen to licensed aboard all privately operated cargo ships presently in operation is 2:32. (Source: U.S. Merchant Marine Data Sheet, April 1, 1977, Department of Commerce U.S. Maritime Administration).

These manpower figures included 22% assigned to the Replacement/Reserve Pool for reassignment, leave, temporary hospitalization and training. The Replacement/Reserve Pool is available to augment immediately the crews of MSC Civil Service ships in an emergency or war. Any expansion of the MSC Fleet Support force will require a larger seagoing labor force of Civil Service mariners. MSC personnel planners indicate that the MSC recruitment program could obtain additional seamen at a rate that would suffice to man ex-USS fleet support ships as they become available to MSC.

9. Any planned transfer of ex-USS fleet oilers to MSC for Civil Service manning or commercial contract manning and operation as fleet support ships should be a phased program. Although the cost analysis in this study has assumed transfers of support ships in FY-79, this assumption was made to provide an economic comparison among the three alternatives. Should a decision be made to replace Navy crews with civilian crews on fleet support ships, an appropriate schedule would have to be developed to avoid disruptions to the Navy's fleet support capabilities. A phased program would allow MSC/MARAD to plan the reconfiguration of the ship for civilian manning, and to recruit and train a crew.

E. LEGAL IMPLICATIONS<sup>1/</sup>

1. Two potential legal difficulties in the use of commercial contract manning of fleet support ships have been determined from discussions and correspondence with COMSC counsel:

a. Contract operation of Government-owned ships in fleet support roles may be prohibited by law.

b. Lack of U.S. Coast Guard certification of fleet support ships in the ABS<sup>2/</sup>Classification will expose the U.S. Government to increased liabilities for personal injuries under the seaworthiness doctrine.

2. Currently, the Military Sealift Command contracts for operation of its Government-owned tanker fleet. The contract for the operation of these vessels is at a fixed price. The ship operators assume full responsibility to move government cargo in compliance with MSC movement orders. Contracting for the operation of ex-USS fleet support ships is, according to COMSC counsel, a different situation.<sup>3/</sup> Underway replenishment, a method of cargo handling not performed in commercial ship operations, is

---

<sup>1/</sup> A detailed discussion of legal implications is contained in Appendix E, "Legal Aspects of Increased Civilian Manning of U.S. Fleet Support Ships".

<sup>2/</sup> American Bureau of Shipping

<sup>3/</sup> COMSC Counsel Memorandum, "Contract Operation of Fleet Support Ships", dated 2 March 1977.

closely supervised and controlled by Naval task group commanders.

3. The Armed Services Procurement Regulations (ASPR) disallows any contracts that have the appearance of a personal services contract.

In this respect, the close employer/employee relationship, wherein the Navy specifies the qualification of the contractor's employees, promulgates schedules and assignments upon which the regular hours and overtime depend, and supervises the entire underway replenishment operation, appears to have personal services implications for commercial contract fleet support ship operations. A judicial review and interpretation of ASPR is beyond the scope of this study, however, the impact of ASPR upon use of commercial contract crews on MLSF ships needs to be further investigated.

4. The second legal issue concerns the liability of the U.S. Government with regard to potential lawsuits. These suits may arise from accidents to both commercially operated fleet support ships and their embarked crews, and may involve a lack of U.S. Coast Guard certificability. U.S. Navy's fleet support ships that are candidates for commercial contract manning possibly do not comply with the rules for ship construction set by the U.S. Coast Guard and the American Bureau of Shipping (ABS) for privately operated fleets.



COMSC advises that the costs to reconfigure ex-USS fleet support ships to meet Coast Guard certification and ABS classification to permit commercial contract manning would be prohibitive.<sup>1/</sup>

5. A Navy Civil Service mariner injured aboard a Civil Service manned fleet support ship can make a claim under the Federal Employees Compensation Act, but his recovery for damages is statutorily defined and limited. On the other hand, should commercial contract manning be implemented aboard the non-Coast Guard certified ex-USS fleet support ships, and an injured seaman shows that the approximate cause of his injury can be attributed to lack of seaworthiness, i.e., U.S. Coast Guard certification, there is no comparable limit to the damages he may collect.<sup>2/</sup>

F. NAVY CAREER MANAGEMENT IMPLICATIONS

1. Over 40% of the enlisted billets on board the major fleet support ships are filled by personnel in their first term, hereafter referred to as trainees. Manning these ships with civilians removes training opportunities for naval seamen. Navy ship board petty officers, and most officers, are required to complete sea tours in responsible billets for promotion. If the Navy's active fleet force

---

<sup>1/</sup> COMSC Memorandum, M-7/TAM;jij/lak, dated 14 June 1977

<sup>2/</sup> Ibid.

levels are reduced, sea assignments would be at a premium. The inability to secure such billets for promotion would provide an impediment to otherwise qualified officers and petty officers seeking promotion.

2. Fleet support ships provide excellent training opportunities for officers who seek to command major combat ships and units. This is especially true for officers destined to command aircraft carriers. The MLSF supports carrier task groups and other combatant forces. The UNREP ships, particularly the AOE's, AORs and AOs, operate most frequently in the task group environment. These ships provide an excellent experience for commanding officers qualifying them for further assignment to sea or staffs. If the MLSF ships were transferred to civilian operation, the loss of these command billets would operate to the detriment of the senior officer experience level.

3. Proponents of the use of civilian manpower to crew the Navy's logistic support ship fleet point out that the release of Navy military personnel from support ship assignments for better utilization amongst the Navy's combat fleet is a benefit of civilian manning. This supposition assumes that shortfalls in combat ship personnel manning do exist, and that personnel made available as the result of civilian support ship manning are competent in all respects

to fill vacant billets in combat ships. While this redistribution of Navy military personnel may or may not solve some of the Navy's short term personnel problems, the corresponding loss of personnel billets allocated to each support ship selected for civilian manning could reduce the personnel end strength of the Navy. This reduction in Navy personnel and strength requirements comes at a time when demographic surveys project a 17-20% decline in the number of qualified military applicants during the 1980's as the result of a declining birthrate.<sup>1/</sup> The recruiting environment is also effected by the unemployment rate. During the three years (1973-1976), following the end of the draft, all the services were generally able to meet their manpower requirements in part because of the high unemployment rates. However, a return to the employment levels of 1971-1973 will result in a decline of approximately 10-15 percent in recruitments. The Congress' and current Administration's commitment to lowering unemployment could further erode the recruiting picture.<sup>2/</sup> The civilianization of selected ships could help alleviate this potential problem.

---

<sup>1/</sup>OPNAV Memorandum "Projected Navy Manpower Impact on Increased Civilian Manning of Support Ships", ser 124E/195842 of 9 November 1977.

<sup>2/</sup>"DOD and Navy Manpower Supply Scenarios Through 2001", (Draft) MATHTECH Inc., Bethesda, MD, November 1976 for OP-964.

4. The Civilian Manning concept as described in this study, if fully implemented, results in a net reduction of 6,132 petty officers and 19,327 non-rated personnel. The Navy is currently authorized 63% of its end strength to fill petty officer billets. A reduction in the Navy's non-rated personnel base is disproportionate to the reduction of petty officers. Assuming a 50% petty officer ratio on auxiliary ships, and an arbitrarily imposed maximum rigid top six pay grade ratio, say at the current 63%, then the Civilian Manning program for support ships would result in a 5% decrease in petty officer manning. Naval planners estimate that the end strength reduction because of civilian manning would result in 33,000 fewer accessions. Based upon a 19% career force entry ratio, it is projected that 6300 fewer petty officers will be obtained. This is less than 200 men than the decrement (6132) generated by the change to civilian manning of support ships. Thus civilian manning is not deemed by naval planners to be detrimental to military manning provided OSD does not impose a rigid petty officer ratio on the Navy's end strength.<sup>1/</sup> OPNAV manpower planners,

---

<sup>1/</sup>OPNAV Memorandum "Projected Navy Manpower Impact on Increased Civilian Manning of Support Ships", ser 124E/195842 of 9 November 1977.

after having considered the impact of end strength reductions upon shore billets, have determined that a loss of 6000 petty officers, and even a smaller number of career petty officers, of the 26,000 billets lost, would have minimal impact on shore billets. The Navy is already short of shore billets and does not believe that a further reduction would result if civilian manning of fleet support ships were implemented.

G. SHIP HABITABILITY IMPACT

1. The ship reconfiguration costs submitted by MSC and MARAD provide for improved berthing. Reporting upon its experience with USNS TALUGA (TAO-62), the first fleet oiler to be transferred to MSC for Civil Service manning, MSC planning engineers provided minimal habitability improvements in order to minimize reconfiguration costs on board a ship which already had over 25 years in service. These minimal habitability improvements were acceptable to Civil Service crewmen embarking upon a new phase in their professional careers. However, MSC found it necessary to improve the habitability standards and ship control features of subsequent fleet oilers transferred to MSC in order to attract and keep seamen who had become experienced in underway replenishment. MSC's higher ship reconfiguration costs estimates reflect this experience.

2. MARAD manpower planners indicate that union leaders are prepared to accept minimal habitability standards in older naval ships. Union leaders are aware that an expensive conversion to a short lived ship in order to provide better crew accommodations is uneconomical and would possibly remove older ships from any further consideration in the civilian manning program.

3. MSC ship reconfiguration costs estimates tend to be higher than the MARAD estimates. MARAD has endeavored to hold reconfiguration costs down. MSC believes that it is cost effective to make the ship livable and attractive initially, and to avoid the added expense of improving habitability once the civilian manning concept has been established. MSC estimates also include ballast (in fleet oilers) and waste holding tanks with associated piping systems which will be required to comply with existing or pending pollution regulations.

#### H. ENDURANCE

1. Smaller crews in MLSF ships result in reduced ability to sustain an increased operating tempo in a contingency.

2. Both COMSC and MARAD provide fewer crewmen to operate CONREP and VERTREP stations aboard MLSF ships. This decision is based upon the belief that full station capability of MLSF ships is underutilized in peacetime. Thus



reductions in manpower requirements in peacetime afford substantial manpower cost savings.

3. Navy military manned ships with crews at full SMD manning levels are prepared to conduct full scale CONREP and VERTREP operations in an emergency, contingency, or war. Supporting naval combat ships in task groups generally requires rapid and prolonged underway replenishment operations from the MLSF ships. Crew endurance becomes a crucial factor during such operations, especially if several naval task groups must be consecutively serviced over several days. The Navy military manned MLSF ship with its large crew has the capacity and resiliency to meet surge requirements.

4. Civilian crews aboard MLSF ships which are sized to routine, peacetime operations, will be taxed to provide extended CONREP and VERTREP services to more than a few ships without additional manpower. MSC and MARAD have the ability to augment the crews of ships being operated by them to give full station capability for an emergency, contingency or war, however, endurance will continue to be questionable without the relief crewmen that the Navy military manned ship can provide.



## APPENDIX E

### MISSION CAPABILITIES ANALYSIS

#### A. PURPOSE

In considering the substitution of the civilian mariners for Navy military personnel aboard the Navy's fleet support ships, naval decision-makers and planners are concerned with losses of mission fulfillment capabilities, and especially those losses or changes that may degrade the services to be provided. The purpose of this analysis is to compare the operational capabilities of civilian manned (both Navy Civil Service and Commercial Contract) and Navy military manned representative ships, and to identify those mission areas which must be supported by military detachments.

#### B. METHODOLOGY

The basis for a comparative analysis of the operational capabilities of Navy military manned fleet support ships and Navy Civil Service and Commercial Contract manned fleet support ships is the Required Operational Capability (ROC) Statement for each type/class ship prepared by the OPNAV ship sponsors. The assumption is made that a Navy military manned fleet support ship, with its crew conforming to its Ship Manning Document (SMD) manpower allocations in skills and numbers of personnel, is 100% capable of performing all

of its tasks in assigned mission areas. Abridged Required Operational Capabilities Statements have been prepared for each type/class support ship being considered as a potential candidate for civilian manning. A qualitative assessment of the operational capabilities of civilian manned fleet logistics support ships is compared with the required operational capabilities of the Navy manned counterpart ship. The Navy's terms of reference upon which this analysis is based are described in the following sections.

C. MISSION AREAS

1. Navy ships are constructed with characteristics that enhance their performance in specified mission areas. Table E-1 displays the designated primary and secondary mission areas selected by OPNAV planners for fleet logistic support ships. A primary naval warfare mission area is an area which a unit must be fully capable of performing in order to carry out assigned tasks. A secondary naval warfare mission area is an area which a unit may be expected to perform, but which is not essential to the accomplishment of its designed performance capabilities.<sup>1/</sup>

2. Primary and secondary mission areas assigned to fleet logistic support ships are briefly described as follows:

---

<sup>1/</sup>OPNAV INSTR. C3501.2E dated 19 Oct. 1977

TABLE E-1  
PRIMARY (P) AND SECONDARY (S) MISSION AREAS  
FOR SELECTED U.S. NAVY FLEET SUPPORT SHIPS

<u>TYPE UNIT</u>	<u>MOB</u>	<u>CAC</u>	<u>AAW</u>	<u>SUW</u>	<u>FSO</u>	<u>NCO</u>
AF	P	P	S	S	P	S
AFS	P	P	S	S	P	S
AOR	P	P	S	S	P	S
AOE	P	P	S	S	P	S
AE	P	P	S	S	P	S
AO	P	P	S	S	P	S
AD	P	P	S	S	P	P
AS	P	P	S	S	P	P
AR	P	P	S	S	P	P
ARS	P	P	S	S	P	S
ASR	P	P	S	S	P	S
ATF	P	P	S	S	P	S
ATS	P	P	S	S	P	S

P = Primary Mission Area

S = Secondary Mission Area

MOB = Mobility

CAC = Command and Control

AAW = Anti-Air Warfare

SUW = Surface Warfare

FSO = Fleet Support  
Operations

NCO = Non-Combat  
Operations

NOTE: The data presented here and in Table E-3 uses the terms of reference and format found in OPNAVINST 3501.2C dated 11 Dec 1972. This instruction has been recently superseded by OPNAVINST C3501.2E dated 19 Oct 1977. However, the data base for this table and Table E-3 have not been changed and the Required Operational Capability (ROC) statements utilized by naval planners use the superseded instruction.

- Mobility (MOB) - moving and maintaining themselves.
- Command and Control (CAC) - coordination of external organizations and control of own units facilities.
- Anti-War Warfare (AAW) - operating against airborne targets.
- Surface Warfare (SUW) - operating against surface and land forces.
- Special Warfare (SPW) - selected operations.
- Fleet Support Operations (FSO) - providing logistic support or services to other fleet units.
- Non-Combat Operations (NCO) - selected operations which are not involved with combat.

3. The foregoing mission areas are exercised using a scenario provided by a Projected Operational Environment (POE) Statement for each type/class of ship.

D. PROJECTED OPERATIONAL ENVIRONMENT (POE) STATEMENTS

1. The POE Statement includes wartime and peacetime operating conditions as well as information pertinent to developing Navy Ship Manpower Documents (SMDs).

2. POE Statements for fleet logistic support ships are developed following the example shown below:

Projected Operational Environment For XXX Class Ships

- At sea in wartime



- Capable of performing all offensive and defensive functions simultaneously while in Readiness (Battle) Condition I.
- Capable of performing other functions which are not required to be accomplished simultaneously.
- Continuous Readiness (Cruising) Condition III.
- Task echelon which the ship type is capable of supporting.

3. For underway replenishment ships the POE statement defines the number of transfer stations or rigs that must be simultaneously manned and total hours of underway replenishment operations expected per week (Table E-2).

4. For tenders and repair ships the POE statement describes the composition, by type and maximum number, of ships to be tended simultaneously; the projected average customer support hours required for each type of ship by work center; and total projected customer support hours required annually.

5. Fundamental and supporting mission areas accompanied by POE statements for each type/class of fleet logistic support ships provide ship sponsors with the information needed to prepare Required Operational Capability (ROCs) Statements which delineate the operational tasks and the levels of performance (full or partial) that must be achieved in the performance of their missions.

TABLE E-2. MLSF SHIPS LIMITING  
PERIOD OF UNREP OPERATIONS  
(POE STATEMENTS)

SHIP			HOURS/WEEK-NORMALLY NOT TO EXCEED		
<u>TYPE</u>		<u>CONREP</u>	<u>VERTREP</u>		
AF		(Note 1)	(Note 1)		
AFS		28	32		
AOR		32	20		
AOE		32	32		
AE		32	20		
AO		32	20		

Note (1): POE statement not available. One ship of type currently operated by COMSC with Civil Service crew.

E. REQUIRED OPERATIONAL CAPABILITIES (ROC) STATEMENT

1. The ROC is a composite listing of mission areas together with the POE statement that provides the detail and criteria to establish manpower requirements. The ROC statement is derived from warfare mission areas, operational capabilities, and suboperational capabilities. ROCs list the operational tasks that the ship must perform.

2. The use of an abridged ROC (Table E-3) prepared from guidelines provided by OPNAV, and using existing Navy ROCs for each type/class of support ship that is a potential candidate for civilian manning was to facilitate the analysis. All the mission areas assigned by OPNAV (Table E-1) are listed. Likewise, all subdivisions of a mission area which more specifically delineates appropriate operational functions for a civilian manned ship are included. However, those operational functions which have a purely military orientation have been eliminated. All suboperational functions have been excluded for brevity.

3. Value judgments made by the Study Team on the performance level of each ship manning option were graded as follows:

F - Indicates the capability to be fully achieved.

For support functions, sufficient manning is provided to ensure effective accomplishment of all included tasks.

TABLE E-3  
FLEET SUPPORT SHIP REQUIRED  
OPERATIONAL CAPABILITIES FORMAT

MISSION AREAS		MANNING CAPABILITY		
<u>OPERATIONAL CAPABILITIES</u>		<u>NAVY</u>	<u>MSC</u>	<u>MARAD</u>
MOBILITY (MOB)		(Value determinant indicators (Note 1))		
<ul style="list-style-type: none"><li>- Steam to designed capability</li><li>- Repair Engineering casualties</li><li>- Control damage</li><li>- Maneuver in formation</li></ul>				
COMMAND AND CONTROL (CAC)				
<ul style="list-style-type: none"><li>- C<sup>3</sup> facilities for embarked OTC and staff</li><li>- Coordinate and control task organizations</li><li>- Provide communications for coordination and control of task organization</li><li>- Provide own-unit's command &amp; control functions</li></ul>				
ANTI-AIR WARFARE (AAW)				
<ul style="list-style-type: none"><li>- Detect, identify, &amp; track air targets</li><li>- Engage air targets with surface to air armament</li><li>- Conduct electronic warfare (EW) against air targets</li></ul>				
SURFACE WARFARE (SUW)				
<ul style="list-style-type: none"><li>- Engage surface targets with anti-surface armaments</li><li>- Detect, identify &amp; track surface targets</li><li>- Conduct electronic warfare (EW) against surface targets</li></ul>				
SPECIAL WARFARE				
<ul style="list-style-type: none"><li>- Conduct surveillance &amp; reconnaissance</li><li>- Conduct navigation or weather station operations</li><li>- Conduct search and rescue (SAR) operations in a combat environment</li></ul>				

TABLE E-3 (Cont.)

<u>OPERATIONS</u>	<u>NAVY</u>	<u>MSC</u>	<u>MARAD</u>
FLEET SUPPORT OPERATIONS (FSO)			
- Conduct underway replenishment			
- Conduct towing/salvage/rescue operations			
- Repair and overhaul ships			
- Support ships and aircraft in supplies, ordnance and other services			
- Provide sealift for cargo & personnel			
- Provide explosive ordnance disposal services			
NONCOMBAT OPERATIONS (NCO)			
- Conduct search and rescue			
- Relay naval communications			
- Conduct meteorological, hydrographic, and/or oceanographic surveys			
- Provide fleet training services			
- Provide medical/dental care			
- Provide administration and supply support for own-unit			
- Provide upkeep and maintenance for own-unit			
- Provide nuclear weapons readiness for ship's squadron's weapons systems			
- Conduct diving operations			

-----

Note 1 - Value determinant indicators

F - Indicates the capability fully achieved

P - Indicates the capability partially achieved

A - Indicates the assistance of off-watch or off-duty personnel is necessary to achieve the required degree of capability

L - Indicates a last capability with civilian manning

E - Indicates a requirement for a Navy MILDET to achieve the desired capability

\* - Indicates a function that is not a required capability for this ship

- P - Indicates the capability is partially achieved.
- A - Indicates that off-watch or off-duty personnel are necessary to achieve the required degree of capability.
- L - Indicates a capability that is lost in the transition from Navy military manning to Navy Civil Service manning or commercial contract manning.
- E - Indicates the capability is not required for this type/class of ship.

F. FINDINGS

The results of Navy and MSC/MARAD ROC assessments are displayed in Table E-4. The ROCs themselves using Table E-3 as the format are to be found in Appendix K, Volume IV. No attempt has been made to compare the capability of Navy Civil Service mariners and Commercial Contract seamen. For the purpose of this analysis the civilian seaman is judged to be competent regardless of his affiliation with the Civil Service or the commercial sector of the maritime industry. Impact Statements are included in Appendix K, Volume IV giving a brief narration of the findings. All Navy ROCs are classified.

G. LOSS OF CAPABILITY

1. In the transition from Navy military manned fleet support ships to Navy Civil Service and Commercial Contract



Table E-4

SUMMARY COMPARISON  
FLEET SUPPORT SHIP OPERATIONAL CAPABILITIES  
NAVY MILITARY MANNING VS  
CIVILIAN (READINESS CONDITION III) MANNING

MISSION	SHIP TYPE	MANNING	PRIMARY				SECONDARY			
			MOB	CAC	FSO	NCO	NCO	AAW	SUW	SPW
STATION	AOE	NAVY MILITARY	F <sub>4</sub>	F <sub>4</sub>	F <sub>5</sub>		F <sub>7</sub> P <sub>1</sub>	F <sub>3</sub>	F <sub>3</sub>	
		CIVILIAN	F <sub>2</sub> P <sub>2</sub>	F <sub>1</sub> P <sub>2</sub> L <sub>1</sub>	F <sub>4</sub> P <sub>1</sub>		F <sub>6</sub> P <sub>2</sub>	L <sub>3</sub>	L <sub>3</sub>	
	AOR	NAVY MILITARY	F <sub>4</sub>	F <sub>4</sub>	F <sub>4</sub> P <sub>1</sub>		F <sub>7</sub> P <sub>1</sub>	F <sub>2</sub>	F <sub>2</sub>	
		CIVILIAN	F <sub>2</sub> P <sub>2</sub>	F <sub>1</sub> P <sub>2</sub> L <sub>1</sub>	F <sub>3</sub> P <sub>2</sub>		F <sub>6</sub> P <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	
SHUTTLE	AF	NAVY MILITARY	F <sub>4</sub>	F <sub>4</sub>	F <sub>3</sub> P <sub>1</sub>		F <sub>6</sub> P <sub>1</sub>	F <sub>1</sub> P <sub>1</sub>	F <sub>2</sub>	
		CIVILIAN	F <sub>2</sub> P <sub>2</sub>	F <sub>1</sub> P <sub>2</sub> L <sub>1</sub>	F <sub>2</sub> P <sub>2</sub>		F <sub>5</sub> P <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	
	AFS	NAVY MILITARY	F <sub>4</sub>	F <sub>4</sub>	F <sub>3</sub> P <sub>1</sub>		F <sub>6</sub> P <sub>1</sub>	F <sub>1</sub> P <sub>1</sub>	F <sub>2</sub>	
		CIVILIAN	F <sub>2</sub> P <sub>2</sub>	F <sub>1</sub> P <sub>2</sub> L <sub>1</sub>	F <sub>2</sub> P <sub>2</sub>		F <sub>5</sub> P <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	
	AE	NAVY MILITARY	F <sub>4</sub>	F <sub>4</sub>	F <sub>4</sub> P <sub>1</sub>		F <sub>7</sub> P <sub>1</sub>	F <sub>1</sub> P <sub>1</sub>	F <sub>2</sub>	
		CIVILIAN	F <sub>2</sub> P <sub>2</sub>	F <sub>1</sub> P <sub>2</sub> L <sub>1</sub>	F <sub>3</sub> P <sub>2</sub>		F <sub>6</sub> P <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	
	AO	NAVY MILITARY	F <sub>4</sub>	F <sub>4</sub>	F <sub>3</sub> P <sub>1</sub>		F <sub>5</sub> P <sub>2</sub>	F <sub>1</sub> P <sub>1</sub>	F <sub>2</sub>	
		CIVILIAN	F <sub>2</sub> P <sub>2</sub>	F <sub>1</sub> P <sub>2</sub> L <sub>1</sub>	F <sub>2</sub> P <sub>2</sub>		F <sub>4</sub> P <sub>3</sub>	L <sub>2</sub>	L <sub>2</sub>	
MAJOR SUPPORT	AD	NAVY MILITARY	F <sub>4</sub>	F <sub>4</sub>	F <sub>3</sub> P <sub>2</sub>	F <sub>7</sub> P <sub>2</sub>		F <sub>1</sub> P <sub>1</sub>	F <sub>2</sub>	
		CIVILIAN	F <sub>3</sub> P <sub>1</sub>	F <sub>1</sub> P <sub>2</sub> L <sub>1</sub>	F <sub>3</sub> P <sub>2</sub>	F <sub>6</sub> P <sub>3</sub>		L <sub>2</sub>	L <sub>2</sub>	
	AS	NAVY MILITARY	F <sub>4</sub>	F <sub>4</sub>	F <sub>2</sub> P <sub>2</sub>	F <sub>7</sub> P <sub>2</sub>		F <sub>1</sub> P <sub>1</sub>	F <sub>2</sub>	
		CIVILIAN	F <sub>3</sub> P <sub>1</sub>	F <sub>1</sub> P <sub>2</sub> L <sub>1</sub>	F <sub>2</sub> P <sub>2</sub>	F <sub>6</sub> P <sub>3</sub>		L <sub>2</sub>	L <sub>2</sub>	
	AR	NAVY MILITARY	F <sub>4</sub>	F <sub>4</sub>	F <sub>4</sub> P <sub>1</sub>	F <sub>6</sub> P <sub>2</sub>		F <sub>1</sub> P <sub>1</sub>	F <sub>2</sub>	
		CIVILIAN	F <sub>3</sub> P <sub>1</sub>	F <sub>1</sub> P <sub>2</sub> L <sub>1</sub>	F <sub>4</sub> P <sub>1</sub>	F <sub>5</sub> P <sub>3</sub>		L <sub>2</sub>	L <sub>2</sub>	

Table E-4 (Cont)

MISSION	SHIP TYPE	MANNING	PRIMARY				SECONDARY			
			MOB	CAC	FSO	NCO	NCO	AAW	SUW	SPW
MINOR SUPPORT	ARS	NAVY	F <sub>4</sub>	F <sub>4</sub>	F <sub>1</sub> P <sub>1</sub>		F <sub>6</sub> P <sub>2</sub>	F <sub>1</sub> P <sub>1</sub>	F <sub>2</sub>	F <sub>2</sub> P <sub>1</sub>
		CIVILIAN	F <sub>2</sub> P <sub>2</sub>	F <sub>1</sub> P <sub>2</sub> L <sub>1</sub>	F <sub>1</sub> P <sub>1</sub>		F <sub>5</sub> P <sub>3</sub>	L <sub>2</sub>	L <sub>2</sub>	F <sub>2</sub> P <sub>1</sub>
	ASR	NAVY	F <sub>3</sub> P <sub>1</sub>	F <sub>4</sub>	F <sub>1</sub>		F <sub>8</sub>	F <sub>1</sub> P <sub>1</sub>	F <sub>2</sub>	
		CIVILIAN	F <sub>2</sub> P <sub>2</sub>	F <sub>1</sub> P <sub>2</sub> L <sub>1</sub>	F <sub>1</sub>		F <sub>7</sub> P <sub>1</sub>	L <sub>2</sub>	L <sub>2</sub>	
	ATF	NAVY	F <sub>4</sub>	F <sub>4</sub>	F <sub>1</sub>		F <sub>6</sub> P <sub>2</sub>	F <sub>1</sub> P <sub>1</sub>	F <sub>2</sub>	F <sub>2</sub> P <sub>1</sub>
		CIVILIAN	F <sub>2</sub> P <sub>2</sub>	F <sub>1</sub> P <sub>2</sub> L <sub>1</sub>	F <sub>1</sub>		F <sub>5</sub> P <sub>3</sub>	L <sub>2</sub>	L <sub>2</sub>	F <sub>2</sub> P <sub>1</sub>
	ATS	NAVY	F <sub>4</sub>	F <sub>4</sub>	F <sub>1</sub> P <sub>1</sub>		F <sub>7</sub> P <sub>1</sub>	F <sub>1</sub> P <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>
		CIVILIAN	F <sub>2</sub> P <sub>2</sub>	F <sub>1</sub> P <sub>2</sub> L <sub>1</sub>	F <sub>1</sub> P <sub>1</sub>		F <sub>6</sub> P <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	F <sub>3</sub>

CIVILIAN = Navy Civil Service or Commercial Contract manning

F = Full Capability

P = Partial Capability

L = Lost Capability

NOTE: Subscripts denote the number of ROCs which can be fully or partially performed, or which are lost within each mission area

manning, a degradation in capability sets in with the loss of purely military functions by the elimination of naval personnel serving weapons and weapon support systems, for example, in the AAW and SUW mission areas. The elimination of the Combat Information Center (CIC) as a military function also restricts the civilian manned ships participation (MOB) in naval task group tactical maneuvers. Civilian ship's officers are certainly capable of handling their ships in convoy type formations but the more intricate naval task force formations have the potential to hazard civilian manned ships without naval task force maneuvering training and the resources needed to maintain a display of ships in the formation. The Mobile Logistic Support Force (MLSF) ships directly supporting naval combat ships at sea are more affected by the integration of ships in task units than the tenders, repair ships, and towing and salvage forces.

2. Another factor in the effectiveness of all ships engaged in naval warfare is the capability to sustain material and personnel casualties from combat operations. Navy military manned ships have many organized on-station damage repair parties in combat situations. These on-scene repair parties fight fires, control flooding, restore casualties to equipments, and furnish reliefs for personnel engaged in ship and weapon control. The civilian manned ship with

reduced manning has a limited damage control and firefighting capability. This degradation to a civilian manned ability to survive in wartime is a factor in naval force level planning.

#### H. EFFECTIVENESS OF MLSF SHIPS

1. Underway replenishment ships in the MLSF which are candidates for civilian manning have crew sizes based upon estimates of the minimum number of RAS/FAS/VERTREP stations which need to be manned for normal UNREP peacetime requirements. All MSC/MARAD manpower proposals for each of the representative ships in the MLSF plan to man fewer stations than is required by OPNAV/POE requirements as shown below:

TABLE E-5 VERTREP + RAS + FAS STATIONS

<u>SHIP</u>	<u>NAVY</u>	<u>CIVILIAN</u>
AF	12	5
AFS	6	5
AOR	9	6
AOE	11	8
AE	8	5
AO	8	5

2. The fact that MSC/MARAD propose manning fewer stations than Navy military manning raises the issue of reduced capability in the FSO mission area.

3. In concept, fleet underway replenishment in wartime requires the transfer of all cargo requirements to customer ships in a minimum period of time in order to reduce the

vulnerability of the ships to attack and to expedite the deployment of forces. This assumes that all ships can receive and store or strike below fuel and cargo at the delivering ship's total delivery capability (amount/station x number of stations). Aircraft carriers, large cruisers and amphibious ships can usually accept at the maximum delivery rate of the UNREP ship, but this is not always the case for smaller combatants. MSC and MARAD MLSF ship manpower estimates assume, in peacetime, that to deliver total requirements to a customer ship using fewer stations may take a little longer to accomplish but the economic benefits from manning fewer stations is an acceptable trade-off.

#### I. COMPARISON OF AO AND TAO EFFECTIVENESS

The major concern of both navy logistic planners and fleet operational commanders is whether the performance and productivity of civilian manned ships with their smaller crews can effectively produce and perform the missions of the Mobile Logistics Support Forces. The Navy's experience in the operation of civilian manned UNREP ships is limited to Navy Civil Service manned fleet oilers (AOs). A limited account of operational data is now available. The following analysis is based on this limited empirical data taken from CINCPAC logistic commander's reports. In one case it consists of two months of operation (November 1976 and March

1977) and in the other case one year of operations (April 1976 through March 1977). While the data is current, the conclusions drawn must be viewed in the context of this limitation. Another limitation of the data was that it was obtained from ships operating only in the Pacific Ocean while the operating profile for this report is based upon Atlantic Operations. However, the data is useful in helping the decision maker to understand the quantitative differences between the two types of manning.

1. Data

- a. Data on fleet oiler operations in the Pacific Fleet from April 1976 through March 1977 was obtained from a Task Force 73 message (012311Z, June 77), subject: "Utilization Statistics." This report provided data on ship availability and replenishment activity for three Navy Civil Service manned and three Navy military manned oilers, allowing for a comparison of replenishment activity on a ship for ship basis. The content of this report is summarized in Table E-5, which describes 449 replenishments that took place during this period of time. Overall approximately three million barrels of fuel were delivered.

- b. Detailed data on particular replenishments for the months of November 1976 and March 1977 was provided by two COMSURFPAC reports: "COMSURFPAC Underway Replenishment



TABLE E-5

DELIVERIES BY NAVY OILERS  
TO PACIFIC FLEET SHIPS  
April 1976 through March 1977

Characteristics	Type Crew of Ship Making Delivery	
	Navy Military	Navy Civil Service
Oilers Operational	3	3
Deliveries Made	131	318
Barrels (000)	488	2649
Ship Days (Days in Theater)		
Days in Port	230	561
Days at Sea	136	537
Total	<u>366</u>	<u>1098</u>
Percent of Ship Days At Sea	37%	49%

Source: TF73 Message  
012311Z June 77,  
for a period from  
April 1976 through  
March 1977

Data", (RCS 8025-1A), for November 1976 and March 1977.

These reports provided information on time taken to replenish, pumping rate, type of ship replenished, sea state and visibility during the replenishment. The information from this report is summarized in Table E-6, which describes the replenishment of 221 ships some of which were replenished simultaneously. Because simultaneous replenishment is not reported as such, the number of two ship replenishments cannot be determined. The data describes the activities of three Navy military manned and three Navy civil service manned fleet oilers.

## 2. Measures Employed

a. From these two data sources a number of measures of operational effectiveness could be extracted. These were of two types: those measuring availability of the ships and those measuring their productivity once they were available to carry out their missions. Each measure used as a basis for comparison is extracted from a single data source, in order that each measure appropriately reflects performance differences between Navy military and Navy civil service fleet oilers.

b. Availability data for the oilers was measured in two ways. The first measure, Days in Theater, describes the time the ships spent away from their home port and as a

TABLE E-6

DELIVERIES BY NAVY OILERS  
TO PACIFIC FLEET SHIPS  
(Number of Underway Replenishments)

Variables Affecting Delivery		Type Crew of Ship Making Delivery	
Factor	Condition	Navy Military	Navy Civil Service
Type of Ship Delivered To	Carrier	17	8
	Cruiser	2	17
	Escort	58	79
	Logistic	10	30
Number of Stations Employed For Replenishing One Ship	1	47	48
	2	27	82
	3	13	4
	4 or more	0	0
Number of Hoses Used to Replenish One Ship	1	46	50
	2	27	77
	3	3	3
	4	2	1
	5	5	3
	6	4	0
Volume	1,000-3,999	66	112
	4,000-6,999	7	14
	7,000-9,999	2	1
	10,000-19,999	3	3
	20,000 +	9	4
Total Number of Replenishments		87	134

Source: "COMSURFPAC Underway Replenishment Data" (RCS 8025-1A) for November, 1976 and March, 1977

consequence reflects the time they were available to support fleet operations. The second measure, Days at Sea, describes the time these ships were actually available to make a replenishment.

c. Productivity of the oilers is measured in three ways. The first measure, Deliveries Made, is a count of the number of ships that were replenished. The second, Delivery Rates, refers to the average number of barrels of fuel transferred per minute alongside. It reflects the loss of time in rigging and unrigging hoses, differences in pumping speeds and other related aspects of efficiency. A third measure, Stations Manned, is the average number of pumping stations that were used during the replenishments. Other factors being equal, a ship that is able to man five pumping stations is likely to be a more effective ship than one that is able to man only three pumping stations.

d. Delivery Rate and Stations manned were based on the two month data, while the other three measures were based on data of 12 month duration. As a result, all of the measures analyzed below are not based on the same period of time.

### 3. Availability Analysis

In terms of overall availability, the three Civil Service manned ships spent 1098 days in the theater while

the three military manned ships spent 366 days. The Civil Service manned ships spent 537 days at sea, while the military manned ships spent 136 days at sea. The difference in days in the theater can be accounted for, presumably, by the Navy policy of deployment rotation. The difference in the time spent at sea requires a different interpretation. Of their total days in the theater, Navy Civil Service manned ships spent 49% of the time at sea, while Navy military manned ships spent 37% of their time in the same state. A summary of the above data, as found in Table E-5, shows Civil Service manned ships being used by the fleet commander about four times as much as their Navy military manned counterparts.

#### 4. Productivity Analysis

a. In terms of peacetime effectiveness, Table E-6 shows a greater number of replenishments completed by the Navy Civil Service manned ships. This is accounted for largely by the greater time the Navy Civil Service manned ships are deployed. Volume of deliveries in itself provides little information on the comparative effectiveness of the two types of manning.

b. The second measure of ship effectiveness, delivery rates, is shown in Table E-7. The overall rate of 41 barrels per minute for Navy military manned ships, while about one sixth faster than for Navy Civil Service manned

TABLE E-7

DELIVERY RATES OF NAVY OILERS  
TO PACIFIC FLEET SHIPS  
November, 1976 and March, 1977

(Barrels per Minute Alongside)

Variables Affecting Delivery		Type Crew of Ship Making Delivery	
Factor	Condition	Navy Military	Navy Civil Service
		(Bbls/min)	(Bbls/min)
Type of Ship Delivered To	Carrier	111	79
	Cruiser	54	42
	Escort	25	29
	Logistic	24	34
Number of Hoses Used To Replenish One Ship	1	18	25
	2	37	38
	3	59	66
	4	262	119
	5	117	126
	6	128	0
Volume (Bbls)	1,000-3,999	23	31
	4,000-6,999	46	48
	7,000-9,999	33	46
	10,000-19,999	87	112
	20,000 +	144	108
Average Delivery Rate		41	35

Source: "COMSURFPAC Underway Replenishment Data" (RCS 8025-1A) for November, 1976 and March, 1977



ships, can be accounted for by the fact that Navy military manned ships refueled a larger number of carriers than the civilian manned ships. The larger ships can be refueled with a smaller proportion of non-production time. Also the delivery rate is a function of acceptance rate of the receiving ship. The other differences observable between the two types of crews, such as when replenishing carriers or replenishing with four hoses, are situations where there are such a small number of observations that the difference may easily be due to chance. Overall, the measure of barrels delivered per minute appears to be determined more by the volume to be delivered than by any aspect of the delivering ship's efficiency. Such a generalization from the data available, however, is tenuous and more data would be needed to improve the confidence of the statistics.

c. The third measure of replenishment effectiveness, Stations Manned, is examined in two ways. In Table E-6 the number of ships replenished with one, two and three stations being manned is shown. No ship was replenished using more than three stations. Since data on simultaneous refueling of two ships is not available, the reported station manning is used without adjustment. The number of stations used in replenishment is generally related to the number of receiver stations of the ship being replenished

and tells presumably very little about the comparative efficiency of the two type crews. A second way of looking at stations manned is illustrated in Table E-8, which shows the average number of stations manned when replenishing different types of vessels. As can be seen in this case, when allowance is made for the size of the ship and its ability to receive fuel there is no discernable difference between the number of stations manned by Navy military and Navy civil service crews.

#### 5. Results

a. Essentially, in peacetime, Navy Civil Service manned ships are three times more available than Navy Military manned ships and they actually made about 25% more deliveries than their Navy Military manned counterparts.

b. There appears to be no discernable difference between the two types of manning for any measure of effectiveness that could be computed from data available.

#### J. WARTIME TRANSITION

1. For peacetime operations MSC and MARAD manpower proposals for UNREP ships provide a 5-8 station manning capability. Offwatch crewmen are used to augment the cargo handling and transfer crews. Navy Civil Service crewed fleet oilers have demonstrated the capability to service the fleet with fuel at the current tempo of operations

TABLE E-8

DELIVERIES BY NAVY OILERS  
TO PACIFIC FLEET SHIPS

(Average Number of Stations Manned) <sup>1/</sup>

Variables Affecting Delivery		Type Crew of Ship Making Delivery	
Factor	Condition	Navy Military	Navy Civil Service
Type of Ship Delivered To	Carrier	2.6	2.3
	Cruiser	2.0	2.0
	Escort	1.3	1.6
	Logistic	1.3	1.4
All Replenishments		1.7	1.7

Source: "COMSURFPAC Underway Replenishment Data" (RCS 8025-1A) for November, 1976 and March, 1977

Note:

<sup>1/</sup>Maximum number of stations used during any replenishment of a ship did not exceed three.

scheduled by naval planners. MSC operated fleet oilers have proved their ability to sustain this structured OPTEMPO in peacetime over long periods at sea without serious degradation of services.

2. The POE statement for UNREP ships in wartime requires that CONREP services should not exceed 20 hours per week for the AF and AFS, and 32 hours per week for the AOE, AOR, AE and AO type ships in the MLSF. Crew endurance, in addition to the full usage of UNREP stations, is a significant factor in evaluating wartime efficiency of the MLSF. Navy military manned ships are crewed to SMD manpower levels for both peacetime and wartime operations. Hence, a surge in OPTEMPO can be met by the Navy military manned ship. There is some question that a civilian manned ship, crewed in peacetime to be cost effective, can effect the OPTEMOP of wartime operations. In a rapidly developing naval operation in wartime, fuel, and munition expenditures increase rapidly. Back-to-back CONSOLS by station ships, and CONREPS with ships in a Task Group may tax the endurance of a reduced size ship crew. Because the SMD manning of Navy UNREP ship provides for personnel for other duties in excess of underway replenishment, the Navy military manned UNREP ship has a manpower pool of relief personnel when the ship engages in a heavy UNREP schedule. By organization and management, all crewmen

on these Navy military manned ships can be trained to be proficient in UNREP operations.

3. Both MSC and MARAD have the capability to augment the crews of civilian manned MLSF in case of war. The augmentation would consist of additional transfer station teams to be placed aboard as expeditiously as possible. For UNREP ships at sea it will require that air transportation be provided for these augment crews. Shipboard accommodations will, by necessity, be doubled-up in existing spaces to accept these additional crewmen. The augmentation in concept would require further study if additional ships are to be civilian manned.

4. While the naval planners envision the use of Shuttle and Station Ships in wartime, the loss of a Station ship undoubtedly will require Shuttle Ships to perform as Station Ships. A determined enemy threat against naval MLSF forces is one way of constraining naval combat ship operations. Thus, surviving MLSF ships can expect the OPTEMPO to increase if attrition becomes a factor in deploying the MLSF in wartime. The endurance of the embarked crews is therefore extremely significant during war.

## APPENDIX F

### REDUCED OPERATING STATUS (ROS) ANALYSIS FOR MLSF SHIPS

#### A. INTRODUCTION

##### 1. Background

a. The United States Navy maintains a force of mobile logistic support ships which operate to sustain the combat capabilities of warships and aircraft deployed in areas of naval operations. The size of this support force is determined by the combatant ship force size, characteristics, and wartime employment to be supported.

b. The analysis performed in this study has shown that there could be an excess capacity of MLSF ships during peace-time for fleet support if certain civilian manning options were to be selected. To utilize the increased availability possible with civilian manned MLSF ships and yet retain the capability to deploy required levels of MLSF ships on short notice in the event of a contingency or war, placement of ships in a peacetime Reduced Operating Status (ROS) is an option. The purpose of the analysis performed in this section is to determine cost savings and operational benefits that might be achieved by placing civilian manned MLSF ships in ROS with the ability to return these ships to a Full Operational Status (FOS) in the time prescribed by Naval Planners.



## 2. The ROS Concept

The ROS concept envisions that selected civilian manned MLSF ships be placed in a reduced operating status at U.S. Naval Bases and facilities when not required to meet peacetime fleet support requirements. These ships would remain at pierside for extended periods of time. Because of potential shelf life problems associated with cargo storage aboard ship and the costs associated with the management of cargo loads on a MLSF ship, ROS ships should have all cargo removed ashore. A minimum ship-keeping crew is required to be placed on board to maintain the hull and equipment and provide internal security for the vessel. Manpower resources required to augment the crew in order to meet all underway operational requirements have been identified by MSC and MARAD. In addition, these organizations have also identified the cost of developing and implementing this ROS program.

### B. DISCUSSION

#### 1. Readiness Criteria

a. Each type of ROS ship is assumed to be berthed at either a West Coast or East Coast U.S. Naval Base or Facility with the petroleum products for AOs and Fleet Issue Load List (FILL) cargo for AFSSs and AEs available for loading during the return to Full Operating (FOS) Status period.

b. The required crew sizes and costs of ROS were provided for various levels of surge capability measured

in days relative to the time required to revert from ROS to FOS. These levels were ten, twenty and thirty days to achieve FOS status.

c. Ships are expected to be taken out of ROS in response to an increased demand for their services, however, each type of ship will be returned to service and placed in an ROS/FOS rotational cycle with other ships of its type. The purpose of this rotational cycle is to prolong active ship life and to maintain operational efficiency. Originally, each ship was expected to perform sea trials of at least 1 day each year. As explained later in this section, however, the cost analysis of the data provided showed this plan to be more expensive than rotating the ships annually between the active fleet and a ROS condition.

## 2. Ship-Keeping Requirements

The following specifications were provided to MSC and MARAD for planning and pricing an ROS operation:

a. Machinery is to be shut down but fully ready to be placed in full operating status in sufficient time to meet specified ROS-FOS limits.

b. Hull maintenance is to be performed as follows:

- Routine cleaning and preservation of external and internal areas and compartments.

- UNREP gear is to be maintained so that it may be placed in a fully operational condition within the specified ROS-FOS limits.

- Ship control equipment is to be tested, repaired as necessary and maintained in a fully operational condition within the specified time limit to bring it to FOS.

- Communications equipment is to be tested, repaired as necessary and maintained so that it may be placed in a fully operational condition within the specified time limits to FOS.

- Maintenance records and reports are to be prepared and maintained as required by management.

c. Engineering maintenance is to be performed as follows:

- Propulsion and ancillary equipments are to be routinely cleaned and preserved.

- Periodic checks, tests and trials of machinery and equipment are to be carried out in accordance with technical manuals and standard merchant marine practices. Preventive and corrective maintenance is to be performed so machinery may be placed in a fully operational condition within the specified time limits to FOS.

- Required maintenance records and reports are to be prepared and maintained in accordance with management's engineering instructions.

- A sea trial of one day duration is to be conducted once a year. The sea trial will include operation of underway replenishment equipment.

d. Supply readiness is to be achieved as follows:

- Ship repair parts maintained on board.
- Ships' supply records maintained in accordance with the operator's supply regulations.

e. Personnel Readiness is to be as follows:

- The shipkeeping and maintenance crew is to be identified.

- The additional personnel resources required for returning ROS ships to FOS are to be identified.

- Shipboard and shore training of personnel is to be conducted as required to maintain the levels of UNREP proficiency of the total crew required to achieve a 10, 20 or 30 day FOS status.

- The same military detachments will be available as shown for FOS in the Civilian Manning Study. The military detachment would participate in all ROS oriented activities aboard their assigned ships.

#### C. ASSUMPTIONS

##### 1. Representative Ships

As in the earlier portions of this study, it was assumed that a selected ship within a type is representative of all other ships of that type; i.e. AFS-3, AE-28, AO-177.

AOE and AOR multi-product ships are not candidates for the ROS program.

##### 2. ROS Cases

Two alternative cases were examined. These are:

Case I- All the ships of the above three types would be converted to civilian manning (See Table F-1), and Case II-Selected ships would be converted (See Table F-2). These two cases are examples only. Additional mixes could be considered, but the two shown would be the most feasible cases. For estimating purposes, all costs in this study were assumed to be Atlantic Fleet costs.

a. All Civilian Manned MLSF

(1) Table F-1 shows the allocation of MLSF ships by Fleet Area. Ships assigned both in number and by type to the Mediterranean and Western Pacific Theaters meet the current force levels needed to support the Sixth and Seventh Fleet combatant forces. No changes in these force levels is contemplated as the result of increased civilian manning.

(2) MLSF ships based in U.S. ports would provide training services to the Second and Third Fleets. Inasmuch as these force levels would probably be under-utilized, some of each type should be placed in ROS. Table F-1 shows the type and number of candidate ships placed in ROS under this alternative, designated herein as Case I.

b. Civilian/Navy Manned MLSF

(1) Table F-2 shows the allocation of MLSF ships for the Case II situation. The mix of ship types and numbers in this case was determined by the Study Team with

TABLE F-1  
REDUCED OPERATING STATUS  
ROS - CASE 1  
NAVY CIVIL SERVICE OR  
COMMERCIAL CONTRACT MANNING

MLSF SHIPS AVAILABLE			MISSION AREA					ROS		MIX	
SHIP	LANT	PAC	LANT	MED	PAC	WPAC	IND	U.S. BASED		USN	CIVMAN
								WLANT	EPAC		
AFS	3	4	1	1	1	2	-	1	1		7
AE	5	8	2	1	3	1	-	2	4		13
AO	4	4	1	1	1	1	-	2	2		8
TAO	4	4	2	2	1	3	-				8
TOTALS	16	20	6	5	6	7		5	7		36



TABLE F-2

REDUCED OPERATING STATUS  
 ROS - CASE II  
 NAVY CIVIL SERVICE/  
 COMMERCIAL CONTRACT MANNING  
 AND NAVY MILITARY MANNING

MLSF SHIPS AVAILABLE			MISSION AREA					ROS		MIX	
SHIP	LANT	PAC	LANT	MED	PAC	WPAC	IND	U.S. BASED		USN	CIVMAN
								WLANT	EPAC		
AFS	3	4	1	(1)	1	1+(1)	-	(1)	(1)	3	(4)
AE	5	8	3	(1)	5	(1)	-	(1)	(2)	8	(5)
AO	4	4	3	1	3	1				8	
TAO	4	4	(1)	(2)	(1)	(3)		(1)			(8)
TOTALS	16	20	8	5	10	7		(3)	(3)	19	(17)

(N) - CIVMAN

OPNAV assistance for the purpose of analyzing illustrative program costs and operational efficiency. The ratio of civilian/Navy manned ships reflect the current desires of naval planners to retain sufficient MLSF ships of each type to sustain 1 in 3 Navy Military Manned ship deployment rotations to the MED and WPAC theaters. These USN ships would complement the civilian manned MLSF ships assigned to forward area fleet commanders for more lengthy deployments.

### 3. Navy Civil Service Manning (ROS) Assumptions

The Military Sealift Command provided the data and cost for the two ROS cases as shown above. In providing this data, the following assumptions were made:

a. The AE would be maintained in ROS at Earle, New Jersey.

b. The AFS and AO would be maintained in ROS at Norfolk, Virginia.

c. The maintenance and repair estimates do not include overhaul. The conversions and overhaul would be completed on all ships prior to their going into ROS.

d. The cost estimates include personnel subsistence services aboard the ships in ROS.

e. The same military detachments were specified for ROS as are shown for the FOS ships. The size and cost of these detachments are shown on Table F-3. In practice the Navy may reduce the size of the detachment. The manning requirement for the ROS-FOS sea trials will be the full

TABLE F-3

ANNUAL FYDP AND UNDISCOUNTED ECONOMIC COSTS COMPARISONS  
FOR MILITARY DETACHMENTS ASSIGNED TO UNREP SHUTTLE SHIPS

SHIP TYPES	MILITARY DETACHMENTS (MANPOWER)		NAVY CIVIL SERVICE SHIPS (FY77 \$000)		COMMERCIAL CONTRACT SHIPS (FY77 \$000)	
	NAVY CIVIL SERVICE	COMMERCIAL CONTRACT	FYDP COSTS	AVG. UNDISC. ECON. COSTS	FYDP COSTS	AVG. UNDISC. ECON. COSTS
AFS	45	55	316	451	425	621
AE	27	41	318	462	455	671
AO	19	19	215	309	209	306

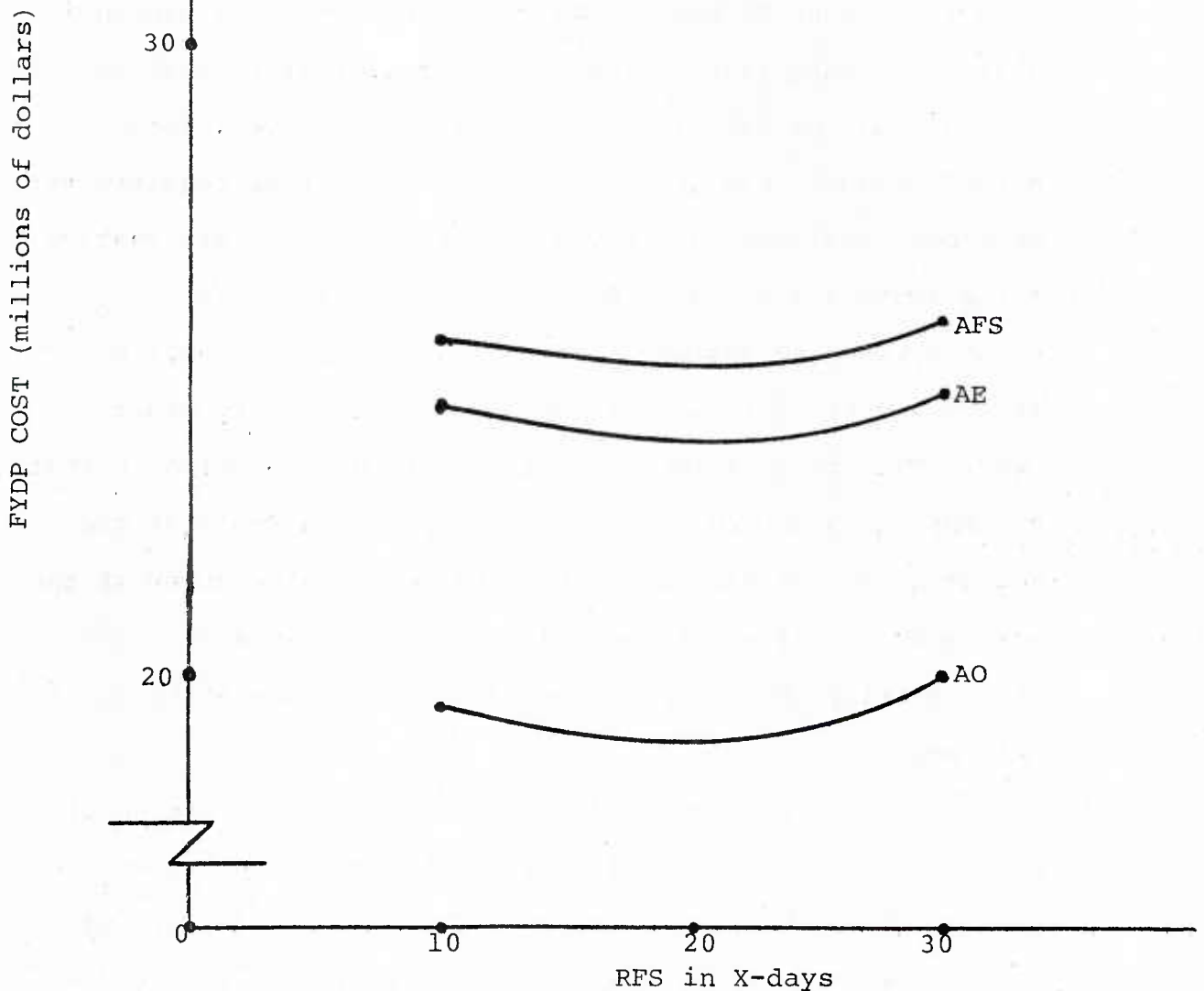
civilian/military crew developed earlier in the study.

f. The initial specification submitted to the Military Sealift Command and the Maritime Administration for the provision of cost estimates recommended that a one day sea trial be performed annually for each of the ships placed in ROS status. Originally the intention was that the ships would be placed in ROS status for two years and tested once a year in order to assure their readiness for sea and their ability to support the Fleet. Both the Military Sealift Command and the Maritime Administration, however, recommended against this procedure. These sea trial requirements were not considered as providing the least cost alternative for placing the ships in ROS status. Instead both organizations recommended that the ships be placed in ROS status and brought out for actual operation every other year. This reduces the operating costs of the ships in that the ROS ships are charged for removal from service at the beginning of one year and return to service the start of the next year. Instead of operating or being tested on a one day sea trial, the ship is tested in actual operation for a full year.

g. Figure F-1 shows a preliminary cost analysis which was performed based on the original concept of a two year ROS with a one day per year sea trial requirement. It will be noted that although there was a reduction on the 20 day Full Operating (FOS) Status in the case of the Navy Civil

Figure F-1

NAVY CIVIL SERVICE MANNED ROS  
ANALYSIS FOR AE, AO, AND AFS  
(CASE 1)



This computation is based on  
2-year retention in ROS and an  
annual one-day sea trial

Service manned ship, the 30 day RFS status cost rises. Based on this preliminary analysis Navy personnel recommended the dropping of the analysis of the one day sea trial requirement and, instead, agreed to pricing out an alternative which return ships to FOS in alternate years.

h. The Maritime Administration and the Military Sealift Command also recommended an additional plan - an unmanned lay-up alternative. This choice would be useful where the condition of excess ship capability could be expected to extend over a number of years. This lay-up alternative results in the deactivation of the ship and its removal from fleet force levels and maintaining the ship without any permanent on-board personnel. This alternative increases the risk associated with the availability of trained crews. MARAD estimated these cost of lay-ups as shown in Table F-4. No further analysis was performed on this alternative because it was not considered responsive (return to FOS in excess of 30 days) to Navy requirements. The cost shown included periodic checks and test of machinery and equipment to be carried out in accordance with technical manuals and standard merchant marine practices. Sea trials of one day duration were included in the cost of the reactivation.

#### 4. Commercial Contract Manning (ROS) Assumptions

a. The Maritime Administration indicated that the cost to achieve FOS status in 10 days would not be greater than that required for the 20 or 30 day FOS capability.



TABLE F- 4  
UNMANNED LAY-UP COSTS<sup>a/</sup>

Fleet Oiler (AO-177)

Deactivate and Reactivate	\$965,000
Maintain in Lay-up (per year)	\$ 80,000

Combat Stores Ship (AFS-3)

Deactivate and Reactivate	\$1,090,000
Maintain in Lay-up (per year)	\$ 135,000

Ammunition Ship (AE 28)

Deactivate and Reactivate	\$1,600,000
Maintain in Lay-up (per year)	\$ 140,000

<sup>a/</sup> These costs were provided by the MARITIME ADMINISTRATION and are shown for information only.

Therefore, only one set of calculations was required for the commercial contract manning ROS analysis.

b. Due to the concern for the availability of trained crews, ROS status required that there be FOS ships of the same or similar type operating with crews drawn from the civilian workforce.

c. All ships delivered for ROS status were assumed to have been overhauled prior to delivery for ROS status. Shipkeeping crews are sized to exercise and maintain all equipment and systems. The costs provided by the MARAD were based on shore supplied steam, electricity and water. It was further assumed that the interior would be maintained at a level commensurate with habitability and work related needs. Practical training evolution concerned with the operation of UNREP equipment were incorporated into the exercise and maintenance schedule. The basic shipkeeping crew was assumed to work on an 0800 to 1700 normal work day.

d. The costs for maintenance and preservation were not provided by the MARAD. Instead they recommended using the costs developed by MSC.

e. A two man security detail consisting of a brow watch and a roving sounding and security watch was planned for the hours from 1600 to 2400 and 2400 to 0800 on normal working days and a 24 hour day (three watches) on weekends and holidays.

f. The steward department was assumed to provide for meals and quarters.

g. The services of a qualified Radio Electronics Officer (REO) was assumed to be required on a roving basis to insure maintenance of radio communications equipment and radio electronic navigation equipment at full operational capability. One REO can handle up to six ships, depending on their location.

h. Contributions to industry training funds by the contractor were included in the costs of active seafarers, both in operational ships and the ROS ships. Therefore, no incremental costs of the onboard subsistence were projected for the training operation.

i. The ships were assumed to maintain heating and ventilation systems in fully operational status as they would at sea. The ship's boilers were assumed to be maintained in a stand by status. It was also assumed they would be periodically pressure tested and fired up.

#### D. MANPOWER REQUIREMENTS

a. Tables F-5, F-6 and F-7 display the manpower requirements for the civilian crews for the AFS, AO, and AE, respectively. In order to simplify the comparison, the column labeled FOS (full operating status) shows the number of civilian personnel required compared to the RFS 10, 20 and 30 days.

b. The military detachment requirements are not shown and they are assumed constant for all the alternatives.

ROS ANALYSIS

TABLE F-15

MANPOWER REQUIREMENTS SUMMARY

TYPE SHIP AFS  
 REPRESENTATIVE SHIP STUDIED 3

DEPARTMENT	Navy Civil Service			Commercial Contract		
	FOS	ROS 10	ROS 20/30	FOS	ROS 10	ROS 20/30
DECK	55	25	18	90	19	19
ENGINE	34	19	17	32	8	8
STEWARD	27	9	7	25	7	7
PURSER	8	4	4	1	0	0
MEDICAL	1	0	0	0	0	0
ALL	125	57	46	148	34	34

ROS ANALYSIS

TABLE F-6

MANPOWER REQUIREMENTS SUMMARY

TYPE SHIP AO  
 REPRESENTATIVE SHIP STUDIED 177

DEPARTMENT	Navy Civil Service			Commercial Contract		
	FOS	ROS 10	ROS 20/30	FOS	ROS 10	ROS 20/30
DECK	37	19	13	36	17	17
ENGINE	22	14	13	26	7	7
STEWARD	22	7	6	21	7	7
PURSER	7	1	1	1	0	0
MEDICAL	1	0	0	0	0	0
ALL	89	41	33	84	31	31

ROS ANALYSIS

TABLE F-7

MANPOWER REQUIREMENTS SUMMARY

TYPE SHIP AE  
 REPRESENTATIVE SHIP STUDIED 28

DEPARTMENT	Navy Civil Service			Commercial Contract		
	FOS	ROS 10	ROS 20/30	FOS	ROS 10	ROS 20/30
DECK	55	25	18	71	19	19
ENGINE	34	19	17	23	7	7
STEWARD	29	9	7	23	7	7
PURSER	3	3	3	0	0	0
MEDICAL	0	0	0	0	0	0
ALL	121	56	45	117	33	33



In the case of the Navy Civil Service personnel, the Military Sealift Command indicated that there is no difference in personnel required for an RFS 20 and RFS 30 case. For the commercial contract manning case, the manpower required for the RFS 10, 20 and 30 day case is identical.

#### E. RESULTS OF COST ANALYSIS

a. The cost analysis includes the ROS manpower, subsistence, fuel requirements, and revised maintenance and repair costs. The results are shown on Tables F-8, F-9, F-10, and F-11. There are a total of 36 ships involved in the ROS analysis since the 4 AOs and 7 AORs are not being considered. Table F-8 displays the FYDP cost comparisons between present manning procedures of the Navy's UNREP ships and the various reduced operating status cases. Row 1 of the table displays the present FYDP cost of the manning scheme of the ships which are being considered for ROS, i.e., 7 AFSSs, 13 AEs, 8 AOs, and 8 TAOs. The cost of these in FY 77 FYDP dollars is the base against which the various alternatives were compared. Case I is based on the premise that the AEs, AFSSs and remaining AOs will be transferred to civilian manning and the third row of Table F-8 displays the FYDP cost saving if this action were to be taken. Row 4 displays the FYDP cost if one were to place 2 AFSSs, 6 AEs, and 4 AOs (12 ships) in reduced operating status as shown on Table F-1. These could respond within 10 days and be made

TABLE F-8  
FYDP COST COMPARISONS - ALTERNATIVE MANNING AND OPERATING  
CASES - NAVY CIVIL SERVICE AND NAVY MILITARY MANNING (\$000 CURRENT YEAR \$)

	CASE I					TOTAL <sup>1</sup> /
	FY 79	FY 80	FY 81	FY 82	FY 83	
1. All Navy Military Manned except 8 AO	442,369	456,400	471,048	486,511	502,776	2,359,104
2. ROS Case I - 7 AFSS, 13 AE and 16 AO Civil Service manned	374,907	265,048	270,858	276,921	283,210	1,407,944
3. Difference between present operations and all Navy Civil Service manning (row 1 minus row 2)	67,462	191,352	200,190	209,590	219,566	888,160
4. ROS Case I - 10 days FOS	335,281	219,738	224,518	229,506	234,675	1,243,718
5. Additional Savings due to placing 12 ships in ROS (10 days RFS) (row 2 minus row 4) FOS	19,626	45,310	46,340	47,415	48,535	207,226
6. ROS Case I - 20/30 day FOS	352,127	216,422	221,172	226,037	231,269	1,247,027
7. Additional Savings due to placing 12 ships in ROS (20/30 days FOS) (row 2 minus row 6)	22,780	48,626	49,686	50,875	51,941	223,908

<sup>1</sup> Total Column - rounded to nearest thousand.

TABLE F-8 (Cont.)  
FYDP COST COMPARISONS - ALTERNATE MANNING AND OPERATING  
CASES - NAVY CIVIL SERVICE AND NAVY MILITARY MANNING (\$000 CURRENT YEAR \$)

	CASE II					
	FY 79	FY 80	FY 81	FY 82	FY 83	TOTAL
8. ROS Case II - 3 AFS, 8 AE, 8 AO Navy Military Manned and 4 AFS, 5 AE and 8 AO Navy Civil Service Manned	443,802	394,708	407,676	420,275	433,496	2,094,957
9. Difference between present operations and Case II (row 1 minus row 8)	8,567	60,692	63,372	66,236	69,280	268,147
10. ROS Case II - 10 days FOS of Navy Civil Service manned ships shown in row 8	421,010	372,472	383,918	395,973	408,631	1,982,004
11. Additional Savings due to placing 6 ships in ROS (10 days FOS) (row 8 minus row 10)	12,792	23,236	23,758	24,302	24,865	108,953
12. ROS Case II - 20/30 days FOS of Navy Civil Service manned ships shown in row 8	410,667	367,643	379,004	390,937	403,537	1,951,788
13. Additional Savings due to placing 6 ships in ROS (20/30 days FOS) (row 8 minus row 13)	23,135	28,065	28,672	29,302	29,959	139,133

ready for sea within that time period. Row 5 displays the additional FYDP savings due to placing these twelve ships in ROS. Row 6 displays the cost incurred if twelve ships were placed in ROS which could respond in 20 or 30 days instead of 10 days. Row 7 shows the additional saving resulting from this reduced responsiveness. Rows 8 through 13 are the comparisons for the Case II ROS Analysis as described on Table F-2. As indicated on that Table, this analysis is based on placing 6 ships in a reduced operating status. Case II is comprised of Navy Civil Service and Navy Military manned ships and therefore the savings shown in row 9 is considerably lower than that shown in row 3. Row 10 displays the cost of operating the Navy Civil Service manned and Navy Military manned mix by placing 6 ships in a reduced operating status. Row 11 displays the additional savings resulting from this reduced operating status and row 12 is a result of pricing out the cost of Case II, except having these ships available in 20 days. Row 13 is the additional savings due to placing these six ships in a ROS within 20 days response time.

b. The same comparison using ROS Case I and ROS Case II, was made for the Commercial Contract manning alternative as well as the combined Commercial Contract and Navy Military manning alternative. Table F-9 displays the results in the same manner as Table F-8. The Maritime Administration did not differentiate between the 10, 20 and 30 days

TABLE F-9

FYDP COST COMPARISONS - ALTERNATIVE MANNING AND OPERATING CASES  
COMMERCIAL CONTRACT AND NAVY MILITARY MANNING (\$000 CURRENT YEAR \$)

	CASE I					TOTAL <sup>1/</sup>
	FY 79	FY 80	FY 81	FY 82	FY 83	
1. All Navy Military Manned except 8 TAO	442,369	456,400	471,048	486,511	502,776	2,359,104
2. ROS Case I All 7 AFS, 13 AE and 16 AO, Commercial Contract Manned	293,993	319,312	326,103	333,145	340,458	1,613,011
3. Difference between present operations and all Commercial Contract manned ships (Row 1 minus Row 2)	148,376	137,088	144,945	153,366	162,318	746,093
4. ROS Case I 10/20/30 days FOS	239,152	257,405	262,911	268,267	274,546	1,302,281
5. Additional Savings due to placing 12 ships in ROS (Row 2 minus Row 4)	54,841	61,907	63,192	64,518	65,962	310,420
<hr/>						
	CASE II					
	FY 79	FY 80	FY 81	FY 82	FY 83	
6. ROS Case II, 3AF, 8AF, 8 AO, Navy Military Manned and 5 AF, 8 AO and 4 AF, Commercial Contract manned	396,498	421,760	434,184	447,252	460,953	2,160,647
7. Case II 10/20/30 days FOS	371,672	388,622	400,388	412,765	425,742	1,999,189
8. Difference between present operations and Case II (Row 1 minus Row 6)	45,871	34,640	36,864	39,259	41,823	198,457
9. Additional Savings due to placing 6 ships in ROS 10/20/30 days FOS (Row 6 minus Row 7)	24,826	33,138	33,796	34,487	35,211	161,458

<sup>1/</sup> Total Column - rounded to nearest thousand

ready-for-sea case. The number of alternatives are thus reduced.

c. Table F-10 shows the undiscounted economic cost comparisons of the Navy Civil Service and military manned Case I and Case II ROS analyses. It is similar to Table F-8 except that the table only displays the undiscounted economic cost and relevant cost savings as described in the explanation of the cost analysis. The economic cost comparisons are indicative of the true resource cost differences between the various alternatives. Thus, while the FYDP cost comparisons show the cash flow differences, the economic cost comparisons are an indicator of the true resource cost to the DOD and to the government.

d. Table F-11 is a display of the economic cost of the present operation and the Navy commercial contract manning cases for the two ROS alternatives.



TABLE F-10

UNDISCOUNTED ECONOMIC COST COMPARISONS - ALTERNATIVE MANNING  
AND OPERATING CASES - NAVY CIVIL SERVICE AND NAVY MILITARY  
MANNING (000 FY 77 year dollars)

## CASE I

	DOD Per Year Cost	U.S. Govt. Per Year Cost
1. All Navy Military Manned Except 8 TAO (present)	\$328,874	\$333,001
2. ROS Case I, 7 AFS, 13 AE, and 16 AO Navy Civil Service Manned	224,775	225,222
3. Difference between present operations and all Navy Civil Service manning (Row 1 minus Row 3)	104,099	107,779
4. ROS Case I 10 days FOS (12 ships)	182,243	182,690
5. Additional Savings due to placing 12 ships in ROS (10 days FOS) (Row 2 minus Row 4)	42,532	42,532
6. ROS Case I 20/30 days FOS (12 ships per Table F-1)	179,047	179,496
7. Additional Savings due to placing 12 ships in ROS (20/30 days FOS) (Row 2 minus Row 6)	45,728	45,726

---

TABLE F-10 (Cont.)  
UNDISCOUNTED ECONOMIC COST COMPARISONS - ALTERNATIVE MANNING  
AND OPERATING CASES - NAVY CIVIL SERVICE AND NAVY MILITARY  
MANNING (000 FY 77 year dollars)

CASE II

	DOD Per Year Cost	U.S. Govt. Per Year Cost
8. ROS Case II 4 AFS, 5AE, 8 AO, Navy Civil Service and 3 AFS, 8 AE, and 8 AO Navy Military Manning	\$295,176	\$297,880
9. Difference between present operations and Case II (Row 1 minus Row 8)	33,698	35,115
10. ROS Case II 10 days FOS (6 ships ROS per Table F-1)	273,317	276,027
11. Additional Savings due to placing 6 ships in ROS (10 days FOS) (Row 8 minus Row 10)	21,859	21,859
12. ROS Case II 20/30 days FOS	271,654	274,360
13. Additional Savings due to placing 6 ships in ROS (20/30 days FOS) (Row 8 minus Row 12)	23,522	23,520

TABLE F-11

UNDISCOUNTED ECONOMIC COST COMPARISON - ALTERNATIVE MANNING  
AND OPERATING CASES - COMMERCIAL CONTRACT AND NAVY  
MILITARY MANNING (\$ 000 FY 77 Year Dollars)

## CASE I

	<u>DOD Per Year Cost</u>	<u>U.S. Govt. Per Year Cost</u>
1. All Navy Military Manned except 8 Navy Civil Service Manned AO (Present)	\$328,874	\$333,001
2. ROS Case I, 7 AFS, 13 AE, and 16 AO, Commercial Contract Manned per Table F-1	269,316	269,866
3. Difference between present operations and all Commercial Contract Manned Ships (Row 1 minus Row 2)	59,558	63,135
4. ROS Case I 10/20/30 days FOS	212,236	212,786
5. Additional Savings due to placing 12 ships in ROS (Row 2 minus Row 4)	57,080	57,080

## CASE II

6. ROS Case II, 4 AFS, 5 AE, 8 AO, Commercial Contract Manned 3 AFS, 8 AE and 8 AO Navy Military Manned	316,663	319,416
7. ROS Case II 10/20/30 days FOS	286,025	288,778
8. Difference between present operations and Case II (Row 1 minus Row 6)	12,211	13,585
9. Additional savings due to placing 6 ships in ROS 10/20/30 days FOS (Row 6 minus Row 8)	30,638	30,638

## APPENDIX G

### LEGAL ASPECTS OF INCREASED CIVILIAN MANNING OF U.S. NAVY FLEET SUPPORT SHIPS

A. BACKGROUND. Replacing Navy military personnel with civilian seamen in U.S. Navy fleet support ships engaged in supporting military forces raises the following issues:

- The role of the civilian seamen employed in a quasi-military vessel engaged in supporting military operations
- The legality of contracting for the operation of Navy fleet support ships by commercial contractors
- Legal problems associated with the contract operation of non-certified fleet support ships with commercial crews
- The legal aspects of disciplinary control in civilian manned ships

### B. LEGAL STATUS OF U.S. CITIZENS EMPLOYED IN U.S. NAVY FLEET SUPPORT SHIPS IN DIRECT SUPPORT OF MILITARY OPERATIONS.

1. Tab A is a memorandum reply provided by the Judge Advocate General, Department of the Navy, in response to questions concerning the employment of civilians in quasi-military ships supporting military operations. The JAG's reply suggests that there are no legal impediments that would prevent civilian seamen from participating in fleet support operations.

2. Tab B is a comment on the legality of placing U.S. Navy fleet support ships under private contractor management and operation as naval auxiliaries. These comments were provided by Counsel for the Military Sealift Command. The MSC is the organization responsible for obtaining shipping services for the Department of Defense. The MSC operates a fleet of commercial tankers, several of which are government owned but chartered for contract operation, in point to point operations. In the opinion of the MSC counsel, the contract operation of the U.S. Navy fleet support ships is a violation of existing Armed Services Procurement Regulations which forbid contracting de facto personnel services because of Government direction and supervision. This agrees with the opinion of the JAG as expressed in Tab A paragraph 3. Tab C, provided by the Office of the General Counsel, Department of the Navy, also concurs with the opinion, and suggests that legislation will be required before the commercial contract operation of fleet support ships could be undertaken.

C. LEGAL IMPEDIMENTS TO EMPLOYING CONTRACT SEAMEN  
ABOARD NON U.S. COAST GUARD CERTIFICATED FLEET SUPPORT SHIPS  
OPERATED UNDER CONTRACT

Tab D is an expression of concern prepared by the counsel, Military Sealift Command, should a contractor attempt to manage and operate a U.S. Navy fleet support ship that cannot qualify for a U.S. Coast Guard certificate of

seaworthiness.

D. LEGAL ASPECTS OF DISCIPLINARY CONTROL IN CIVILIAN  
MANNED SHIPS

1. Under Tab E the COMSC Counsel provides a dissertation on the law as it pertains to discipline of officers and seamen of the civilian manned ships.

2. Tab F describes the statutory authority of the Commandant, U.S. Coast Guard, to investigate and take punitive or remedial action against licensed officers and certificated seamen for incompetency and misconduct, including intemperate habits and other indications of an inability to perform their duties.





DEPARTMENT OF THE NAVY  
OFFICE OF THE JUDGE ADVOCATE GENERAL  
WASHINGTON, D. C. 20370

IN REPLY REFER TO

JAG:131.4:RC/10:JAW:ado  
Ser: 13/5492  
19 May 1977

MEMORANDUM FOR THE DIRECTOR, SYSTEMS ANALYSIS DIVISION, OPNAV (OP-96)

Subj: Legal status of U. S. citizens employed in U. S. Navy fleet support ships in direct support of military operations

Ref: (a) OP-96 memo Ser 96/90222 of 25 Feb 1977  
(b) U. S. Navy Regulations, 1973  
(c) SECNAVINST 5512.9 of 25 Jun 1975, Subj: Identity cards required by the Geneva Conventions for civilians who accompany the Armed Forces; issuance of  
(d) COMSC Counsel Memo M-7/slp of 2 Mar 1977

1. Reference (a) raised various legal questions regarding the use of civilian mariners to serve in U. S. fleet support ships which are presently controlled by the Military Sealift Command (MSC). In response, it is considered that: such personnel generally would be entitled to protection afforded prisoners of war under the Geneva Convention if captured by the enemy; such personnel would be subject to limited administrative sanctions in peacetime and to court-martial sanctions when performing support functions "in the field" during periods of declared war; ships manned by such civilians would be entitled to the sovereign immunity normally granted to government vessels but nevertheless would be subject to port charges and inspection by the Coast Guard in the same manner and frequency as commercial ships.

2. The questions posed in reference (a), with their accompanying answers, are listed below. Because of the various categories of vessels currently operated under the aegis of MSC, it is necessary to emphasize that the views rendered herein apply only to fleet support ships, i.e., those vessels, and the crews thereof, which were formerly "active status, in commission" but are now "active status, in service", as those terms are defined in article 0305 and the Glossary of reference (b). These vessels all fly the U. S. flag and bear U.S.N.S. designations and distinctive stack markings and paint schemes. No opinion is expressed concerning other categories of vessels. Further, no opinion is expressed concerning the legal ramifications of possible offensive or belligerent actions of civilian fleet support vessels, either individually or in direct support of an offensive force.

a. What is the status of civilian personnel employed to man defensive weapons systems aboard fleet support ships when captured by the enemy?

The international legal principles applicable in determining the status and treatment to be accorded individuals who fall into the hands of opposing belligerents in time of armed conflict are found primarily in two of the four Geneva Conventions of 1949. Article 4 of the Geneva Convention Relative

to the Protection of Civilian Persons in Time of War, August 12, 1949, 6 U.S.T. 3516, T.I.A.S. No. 3365 (hereinafter referred to as GC), defines by exception those persons protected by that Convention. Under the provisions of the GC, persons who "find themselves, in case of a conflict or occupation, in the hands of a Party to the conflict or Occupying Power of which they are not nationals" are protected thereunder unless they are considered protected persons under the other three Geneva Conventions; U. S. civilian civil service or contract seamen on fleet support ships are afforded such other protection by those Geneva Conventions. For example, article 4 (4) of the Geneva Convention Relative to the Treatment of Prisoners of War, August 12, 1949, 6 U.S.T. 3316, T.I.A.S. No. 3364 (hereinafter referred to as GPW), awards prisoner-of-war status; *inter alia*, to "[p]ersons who accompany the armed forces without actually being members thereof . . . provided that they have received authorization from the armed forces which they accompany, who shall provide them for that purpose with an identity card . . . ." While ships' crews are not expressly enumerated in article 4 (4) of the GPW, it is considered to cover U. S. civilian crews of fleet support ships. Paragraph 5 of reference (c) requires issuance of a DD Form 489 to "sponsored civilian noncombatant personnel, employees, and others who have been authorized to accompany military forces of the United States and who are liable to capture and detention by the enemy as prisoners of war," including both civil service DoD employees as well as "other civilians accompanying the Armed Forces." It is considered, therefore, that properly authorized and identified U. S. civilian seamen aboard Navy fleet support ships are entitled to prisoner-of-war status under the GPW. In addition, article 13 (4) of the Geneva Convention for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea, August 12, 1949, 6 U.S.T. 3217, T.I.A.S. No. 3363, in language practically identical to that of article 4 (4) of the GPW, ensures that the wounded, sick, or shipwrecked U. S. civilian crews of Navy fleet support ships are afforded the same protections of the Convention as are military crewmen.

b. To what extent may a fleet commander direct the actions of a civilian master of a fleet support ship tasked with direct fleet support, and what, if any, prerogatives does he have available to him to enforce compliance with his directives?

Civil service masters of U.S.N.S. ships which are operating in fleet support are subject to the orders, regulations, and policies of COMSC and the MSC commander having administrative control of the ship. Failure by civil service masters to comply with such orders, regulations, and policies can result in disciplinary proceedings against the master under applicable personnel regulations. MSC does not have the same disciplinary control over members of contract operators, however, and in such cases MSC can only complain to the contractor and perhaps seek the eventual removal of the master for failure to

comply with the orders involved. Court-martial jurisdiction over civilian personnel under certain conditions exists pursuant to 10 U.S.C. § 802, which provides that UCMJ jurisdiction extends, inter alia, to:

(10) in time of war, persons serving with or accompanying an armed force in the field.

(11) subject to any treaty or agreement to which the United States is or may be a party or to any accepted rule of international law, persons serving with, employed by, or accompanying the armed forces outside the United States and outside the following: the Canal Zone, Puerto Rico, Guam, and the Virgin Islands.

The rather broad import of these provisions, however, has been limited severely by the courts to exclude jurisdiction over civilians other than for offenses committed during the actual conduct of military operations in the field in time of armed conflict. Kinsella v. Singleton, 361 U.S. 234 (1960); Grisham v. Hagan, 361 U.S. 278 (1960); McElroy v. Guagliardo, 361 U.S. 281 (1960); Latney v. Ignatius, 416 F.2d 821 (D.C. Cir. 1969) [UCMJ jurisdiction held not to apply to a merchant seaman employed by a civilian contractor under charter to the Navy's MSPS (predecessor to MSC) accused of murdering a shipmate while in port in an area of armed conflict]; Robb v. United States, 456 F.2d 768 (Ct. Cl. 1972); and United States v. Averette, 19 USC 363, 41 CMR 363 (1970) (UCMJ jurisdiction limited to periods of declared war).

c. When an ex-Navy ship, manned by seamen under contract from the commercial sector, visits a port, what is her status in relation to port charges, etc.? Is she treated as a U. S. Navy ship or a commercial ship?

All ships owned or operated by a state and used on Government noncommercial service are entitled to sovereign immunity. Accordingly, such vessels are, inter alia, immune from arrest and search, immune from all foreign taxation, and entitled to complete control over persons on board such vessels. These ships, however, are expected to comply with the laws of the littoral state with regard to order in the ports, the places for casting anchor, and regulatory matters pertaining to safety of the port such as sanitation and quarantine. Such compliance would include liability for payment of port services furnished. The same rules apply in peacetime as well as during periods of hostility.

d. If the U. S. Navy provides ex-Navy ships to general agents to man for the exclusive operations of the Navy, is U. S. Coast Guard certification required?

MSC has an agreement with the Coast Guard basically which provides that



all U.S.N.S. ships will be inspected by the Coast Guard in the same manner and frequency as commercial ships.

3. Finally, the opinions expressed in reference (d) regarding the problems posed by the personal-services-contract nature of subject proposal are concurred in.

A handwritten signature in dark ink, reading "C. E. McDowell". The signature is written in a cursive style with a large, looped initial "C".

C. E. McDOWELL  
Rear Admiral, JAGC, U. S. Navy  
Deputy Judge Advocate General

M-7/slp  
2 March 1977

MEMORANDUM

From: M-7  
To: M-3

Subj: Contract Operation of Fleet Support Ships

Ref: (a) M-311 memo of 24 Jan 1977

Encl: (1) M-7/TAM:lak memo of 28 Feb 1977

1. Reference (a) requested comments on the proposed CNO study to determine the feasibility of civilian manning of fleet support ships, either by civil service mariners or by contract operation.

2. Contract operation of Government-owned ships to carry out a purely Government function is perilously close to the prohibited area of contracting for personal services. This question has been a matter of continuing concern to this office in connection with the operation of tankers. Consequently, when MSC took over the operation of the range ships in the 1960s, which were previously operated by a contractor for the Air Force, it became concerned that direct operation of these ships by civil service mariners was required because of the day-to-day control exercised by Government personnel.

3. A similar concern existed with respect to tankers operated on a cost reimbursable plus fixed fee basis and it was partly this concern which prompted this office to recommend a change in procurement method to a fixed price contract plus certain reimbursables. These tankers are engaged in point-to-point transportation, and thus it can be rationalized that under a fixed-price contract the Government is buying an end product which takes the procurement out of the personal services concept.

4. Enclosure (1) has been prepared by a member of this office to review the applicability of the personal services doctrine to fleet support ships. He has concluded that the degree of control together with other facets of this operation peculiarly unique to the Navy would place any contract for the operation of such ships in the category of a personal services contract and therefore prohibited.

5. Fleet support missions have been or are presently entirely performed by military personnel which further attests to the distinct requirement for close supervision and the uniqueness as a Government function. These ships will in many instances require an embarked military communications group even if operated by civilians. It is also understood that some fleet support ships will be equipped with armaments which will require a high degree of training and control.

M-7/slp  
2 March 1977

6. Accordingly, it is the opinion of Counsel that contract operation of fleet support ships, absent specific Congressional authority, is prohibited.

  
DUDLEY J. CLAPP, JR.



## MEMORANDUM

From: Mr. McGinnis  
 To: --Mr. Clapp  
 Mr. Stickles

Subj: Contract Operation of Fleet Support Ships

Ref: (a) M-311 memo of 24 Jan 1977

1. Reference (a) indicates the CNO is undertaking a study to determine the feasibility of placing the fleet support ships under contract operation. While the economics of such an arrangement can certainly be questioned, there is another, more immediate, question to be answered--that is, does the nature of fleet support operations render a commercial contract for the operation of fleet support ships illegal? In my opinion, the answer to that is yes; such a contract would be prohibited under existing law. The reason for my conclusion can be simply stated; the degree of control exercised by the Navy over fleet support ships and the type of services they perform would make the operating contract, in reality, a contract for personal services; unless specifically authorized by statute, personal service contracts are not permitted. 1/ The following background discussion and analysis of fleet support activities support my conclusion.

A. Statutory and Administrative Authority for Service Contracts

Contracts entered into by the Government generally fall into one of three categories: construction contracts; supply contracts; or service contracts. Contracts which call for a contractor's time and effort rather than a concrete end product, come under the last category (See ASPR 22-101). Most service contracts entered into by the Government are under the jurisdiction of the Service Contract Act of 1965, as amended, and must comply with procedures provided therein (See 41 USC 351 ff).

Service contracts can be further divided into contracts for personal services and non-personal services. Personal service contracts are defined in ASPR 22-102.1 as "the procuring of services by contract in such a manner that the contractor or his employees are in effect employees of the Government."

Early statutory authority permitted Government agencies to contract for goods and services but specifically exempted contracts for personal services. 2/

1/ A legal distinction can be made between contracts for the operation of fleet support ships and contracts for the operation of Government tankers. The type of service performed by the contractor under the later contract does not exhibit the attributes of "personal services" which are found in the former. A discussion of this difference is found in the text of this memo.

2/ "All purchases and contracts for supplies or services in any of the Departments of the Government, except for personal services, shall be made by advertising a sufficient time previously for proposals respecting the same, when the public exigencies do not require the immediate delivery or performance is required by the public exigency, the articles of service required may be procured by open purchase or contract, at the places in the manner in which such articles are usually bought and sold, or such services engaged, between individuals." (Revised Statutes, Section 3709) (emphasis added)

Present Section 2303, Title 10 USC, does not differentiate between services and personal services; however, Section 22 of ASPR does revive the distinction noted in the earlier statute. While permitting contracts for nonpersonal services, provided they are properly issued and administered, ASPR restricts the use of personal service contracts. It appears that it is the policy of the Defense Department not to circumvent civil service laws and regulations by the unauthorized use of 'personal services' contracts.

A limited number of personal service contracts are permitted and are normally negotiated pursuant to 10 USC 2304(a)(4). However, before any such contract can be negotiated, specific statutory authority must exist for the personal services sought. Thus, under 5 USC 3109, an agency may procure by contract the temporary or intermittent services of experts or consultants, including stenographic reporting services. 10 USC 4022 allows the Department of the Army to employ contract surgeons during any emergency; 10 USC 4540 permits the Army to employ private architectural or engineering services for the delivery of designs, plans, drawings and specifications when the Secretary considers it advantageous to the national defense; 10 USC 1037 authorizes the employment of counsel before foreign judicial tribunals and administrative agencies.

In addition to the definition of "personal services" contained in ASPR 22-102.1, the Comptroller General has described a contract for personal service as "... one by which the individual contracted with renders his personal services to the Government through his agents, thus, himself becoming the servant of the Government" (19 Comp. Gen. 523 (1939)). By inference, any contract not calling for personal services would be permitted under Procurement Regulations. The key, then, is the relationship existing between the Government and the contractor; the greater the control of the Government over the contractor and his employees, the more likely it is that the contract is one for personal services and therefore illegal.

#### B. Historic Tests for Determining Personal Service Contracting: The Comptroller General

Both the Comptroller General and the Federal courts have examined service contracts to determine if the Government exercised such a measure of control over the contractor and his employees that for all practical purposes an employer/employee relationship existed between Government and contractor. In the situations investigated by the Comptroller General, agency heads had requested the Comptroller General's advice as to the legality of certain contracts which their respective agencies had intended to enter. For the most part, the agency heads were questioning whether or not the prospective contracts sought services which by law were required to be performed by Federal personnel under the supervision of the Government.

In 26 Comp. Gen. 468 (1947), the Secretary of the Interior questioned the propriety of entering into a contract for physical engineering studies to be prepared prior to construction work on a dam. In approving the contract, the Comptroller General discussed such factors as: the degree of direct Government supervision over the services performed; the furnishing of office or working space by the Government; the use of special knowledge or equipment; the temporary character of the services; the qualifications and availability of Government employees; the



fee or the amount of the contract price (whether it was based upon the results to be accomplished rather than the time actually worked); and the compensation paid (whether it covered not only the contractor's time but the use of his facilities, office staff, equipment and the like). In approving this particular contract, the Comptroller General found that many of the above-mentioned factors did not support an employer/ employee relationship in this particular contract. Since the Southwestern Power Administration had neither the personnel nor the equipment to secure the data prior to the construction, the contract was permissible.

In 1929 the Secretary of War wanted to secure the services of tree surgeons and sought the approval of the Comptroller General before entering the contract. The Comptroller General held that services of tree surgeons were personal; the fact that another agency under the Executive Branch had employed tree surgeons whose job had been classified by the Personnel Classification Board seem to be controlling in this determination. (9 Comp. Gen. 1929)). In another case, the Navy Department attempted to contract with private individuals for the performance of services in connection with scientific investigations and research work which the Comptroller General found to be unauthorized. In this instance, he held that a contract with an individual or firm to perform a duty or to exercise an authority imposed or conferred by law upon a Government department was not authorized by law (6 Comp. Gen. 51 (1926)).

During the Korean War, the Engineer Supply Office in St. Louis entered into a contract for assistance in the preparation of shipping documents. The contract was supposedly needed because of the increased workload caused by the war. The Comptroller General found the contract illegal (32 Comp. Gen. 427 (1953)). He stated:

"Moreover, it would be unreasonable in the extreme to presume that the Congress, while imposing a ceiling on the number of graded civilian employees that could be employed in the Department of Defense, intended to authorize the procurement by Contract from outside sources of services which would be performed by employees of the type involved but for the personal ceiling. Otherwise the limitation would be meaningless. ~

The contract involved provided that the contractor would furnish all services and perform all work necessary to prepare shipping orders, notices of delayed items and other forms connected with shipping orders at the Engineer Supply Control Office . . . as directed by the contracting officer, during the period May 19, 1952 through June 30, 1953, for the unit prices stipulated . . . All heat, office space, utilities operating supplies and miscellaneous equipment required in the performance of the contract was supplied by the Government . . . Under the circumstances, it must be held that the procurement of the services involved by contract was unauthorized, as being in contravention of the above mentioned general rule that purely personal services for the Government are required to be performed by Federal personnel under Government supervision . . ." (pp. 430-431)

C. Historic Tests for Determining Personal Service Contracting: The Courts and the Civil Service Commission

The Civil Service Commission (CSC) and the federal courts have also examined relationships between individuals and the Government to see whether an employer/ employee situation existed. The criteria established by the CSC and later adopted by the courts have been used to analyze whether a specific contract is actually a contract for personal services.

An early case, Stapleton v. Macy, 304 F.2d 954 (C.A. D.C., 1962), which did not involve the legality of a personal service contract discussed the yardstick to be applied in the employer/employee relationship. In that case, the court gave recognition to the long-established criteria set by the CSC and found that they had a reasonable basis in the law, specifically 5 USC Section 2105(a). <sup>3/</sup> The plaintiff in the Stapleton case had been employed by the State of Mississippi for four years under a vocational employment grant-in-aid program; he sought to have this service credited as Federal service under the Civil Service Retirement Act. Adopting the CSC standards, the Court held that to be considered a Federal employee, a person must be (1) engaged in the performance of a Federal function under authority of an Act of Congress or an Executive Order; (2) appointed or employed by a Federal officer; and (3) under the supervision and direction of a Federal officer.

The standards set forth in Stapleton were later used by the Comptroller General in finding the existence of a personal service contract. When the CSC questioned the practice of the Government Services Administration's contracts with firms for clerical assistance during peak workloads or emergencies, the Comptroller General held (44 Comp. Gen. 761 (1965)):

"The existence of an employer-employee relationship depends not upon the nature of the work to be done but upon the method chosen to accomplish that work. . .

3/ 5 USC Section 2501(a) provides:

"(a) For the purpose of the title, 'employees', except as otherwise provided by this section or when specifically modified, means an officer and an individual who is

(1) appointed in the civil service by one of the following acting in an official capacity --

- (A) the President;
- (B) a Member or Members of Congress, or the Congress;
- (C) a member of a uniformed service;
- (D) an individual who is an employee under this section;
- (E) the head of a Government controlled corporation; or
- (F) the adjutant general designated by the Secretary concerned under

section 709(c) of title 32, United States Code;

(2) engaged in the performance of a Federal function under authority of law or an Executive act; and

(3) subject to the supervision of an individual named by paragraph (1) of this subsection while engaged in the performance of the duties of his position."

The generally accepted test of Federal employment includes three requirements; first, performance of a Federal function; second, appointment or employment by a Federal officer; and, third, supervision and direction by a Federal officer . . . . (p. 762)

It has been held that services normally performed by Government personnel may be performed under contract only if it can be shown that contracting out is substantially more economical or feasible or is necessary in the circumstances. That rule is to be applied to contract performance on a strictly job basis under which the Government contracts for the furnishing of a product or the performance of a service with no detailed control or supervision over the method by which the result required is accomplished. See 24 Comp. Gen. 414; 28 id 196; 43 id 390. While the GSA was given specific contracting authority for the receiving, handling and shipping of warehouse items by the above quoted appropriating language, our view is that the provision does not authorize the Administration to enter into a 'personal service' contract for 'employees' support services without regard to the Classification Act and the Civil Service laws (p. 763-764)"

**D. Personal Service Contract: Legal Prohibition or Policy Consideration**

Several decisions of the Comptroller General indicate that the bar on personal service contracting is based upon policy considerations rather than a specific legal prohibition. However, when a contract takes the form of personnel procurement (such as personal service contracts), certain statutes such as the Civil Service Act, the Veteran's Preference Act, the Classification Act and others<sup>4/</sup> are avoided. Several opinions of the Attorney General justify the inference that use of personal service contracts, not authorized by statute, are illegal.

"When a general law prescribes what persons may be appointed to any class or kind of office or place, the time or manner of their appointments, the tenure of their office, their qualifications or the test of their qualifications and fitness, any appointment of that kind thereafter authorized must, unless otherwise provided, be made with reference to and in conformity with the requirements of such general law . . . . in order to exempt such appointment from the operation of the general law, a specific exemption there from would be required . . .

<sup>4/</sup> Statutes which are "circumvented" by contracting for personal services include the following: The Civil Service Act, 5 USC 632 et seq.; The Classification Act of 1949, as amended, 5 USC 1071 et seq.; The Veterans Preference Act, 5 USC 851, et seq.; The Hatch Political Activities Act, 5 USC 118 (i-b); the Dual Compensation Laws, 5 USC 58, 59, 59(a), 60, 61 (a-1); The Conflict of Interest Laws, 18 USC 203, 205, 207, 208, 209; The Anti-Strike Law, 5 USC 188(p); the Federal Employees Compensation act, 5 USC 751 et seq.; The Civil Service Retirement Act, 5 USC 2251, et seq. The Federal Employees Group Life Insurance Act, 5 USC 2091, et seq.; The Federal employees Health Benefits Act, 5 USC 3001 et seq.; The Government Employees Training Act, 5 USC 2301 et seq.; The Federal Tort Claims Act, 28 USC 2671, et seq.



In every statute authorizing or requiring a certain act, there is implied, as if there written, the direction that such act shall be done with reference to, and in conformity with, existing laws on the subject. 25 Op. Atty. Gen. 341

Congress undoubtedly intended that the provisions of the civil service law, so far as these provided for the organization of a classified service, should be extended to all persons engaged in the legitimate civil work of the executive branch of the Government, whether such persons were or were not technically in the employ of the United States. 26 Op. Atty. Gen. 363

Congress may at any time it deems proper exempt any position or any class of positions from the operation of the civil service act, but to do this it must use language indicating clearly and affirmatively its intention to do so. 26 Op. Atty. Gen. 502

... employment in the classified service is to be secured through competitive examination, and not otherwise, in all cases not expressly excepted from the operation of the general rule; and it is in no case to be considered that a position is excepted unless the language relied upon to establish the exception is so plain and unequivocal as to admit of no doubt. 27 Op. Atty. Gen. 95"

#### E. Personal Service Contracts: The Present View of the Civil Service Commission and the Federal Courts

The CSC has been asked to review proposed contracts to determine whether they were, in effect, contracts for the procurement of personnel. Such a task has resulted in the refinement of previous tests used in determining the existence of an employer/employee relationship. The current test contains six elements which were put forth by Leo Pellerzi in October 1967 when he was the General Counsel of the CSC. Reviewing a contract entered into by NASA, Pellerzi discussed personal service contracts in the following manner.

"In the absence of clear legislation expressly authorizing the procurement of personnel to perform the regular functions of agencies without regard to the personnel laws, we must insist on scrupulous adherence to those laws and the policies they embody. Accordingly, contracts which, when realistically viewed, contain all the following elements, lack to any substantial degree either in the terms of the contract, or in its performance, constitute the procurement of personal services proscribed by the personnel laws.

- Performance on-site
- Principal tools and equipment furnished by the Government
- Services are applied directly to integral effort of agencies or an organizational subpart in furtherance of assigned function or mission
- Comparable services, meeting comparable needs, are performed in the same or similar agencies using civil service personnel
- The need for the type of service provided can reasonably be expected to last beyond one year



--The inherent nature of the service or the manner in which it is provided reasonable requires directly or indirectly Government direction or supervision of contractor employees in order:

- To adequately protect the Government's interest, or
- To retain control of the function involved, or
- To retain full personal responsibility for the function supported in a duly authorized Federal officer of employee"

In setting forth the above criteria, Pellerzi noted that they embodied the same considerations as the common law test of control of a servant; "(i)t is the right or power to control the individual in the performance of his work and the manner in which the work is done that is usually decisive." Thus, the inference is that the standards which Pellerzi discussed should not be mechanically applied to any one contract. As Pellerzi stated in his Opinion:

"The criteria must be realistically applied and the end-point determination reached on the basis of the overall substance of the contract operations. For the purpose of ensuring compliance with the personnel laws we do not believe it possible to refine the criteria or weigh their elements in application so as to indicate that mere changes in form or terminology will meet the substance of the Commission's objections. If, in substantial effect, the contract results in a form of personnel procurement not expressly authorized by law, it is proscribed by the personnel laws.

In July of 1968, a supplemental opinion to that of Pellerzi was given by Anthony L. Mondello who succeeded Pellerzi as General Counsel of the CSC. The supplemental opinion was intended to clarify some of the ambiguities of the Pellerzi standards.

One question in the application of the Pellerzi Opinion was whether all six of the Pellerzi standards had to be present, each to a substantial degree, before a particular contract would be considered a personal service contract. Discussing this issue, the Mondello Supplement reemphasized the connection between the Pellerzi standards and 5 USC 2105(a), the former being a regulatory implementation of the later. Mondello then stated:

"The absence of any one or a number of (the six Pellerzi Elements) would not mean that supervision does not exist but only that there is less likelihood of its existence. Moreover, any single element may not be significant unless its presence is, <sup>fact</sup> ~~not~~ to a substantial degree."

A recent decision handed down by the District Court for the District of Columbia, Lodge 1858, American Federation of Government Employees v. N.A.S.A., Docket No. 3261-67, August 12, 1976, adopted the Pellerzi Standards with the Mondello Supplement as a tool for determining the legality of various NASA support contracts. While recognizing the importance of the Pellerzi standards as indicative on an employee status under the contrast, the Court found that the

controlling test was whether the inherent nature of the service, or the manner in which it was provided, requires Government direction or supervision of the contractor employees. Moreover, that supervision, if it exists, can either be direct or indirect and need not be continuous for the Government to be considered a de facto employer.

#### F. Personal Service Contract Standards Applied to Fleet Support Operation

The Federal courts, the Comptroller General and the Armed Services Procurement Regulations have given guidelines for analyzing specific contracts to determine if they are illegal by reason of being procurements of personal services. While we do not have an actual or proposed contract for operating fleet support ships to analyze in this manner, we can project what type of proposals would need to be included in order to adequately serve the Navy's purpose. By doing this, we soon realize that the nature of fleet support activity requires that the Navy exercise such a degree of control that any contract fulfilling the Navy's needs in this regard would be considered a personal service contract, under any of tests discussed above.

(1) Personnel Requirements - Most of the support operations are accomplished through underway replenishment. A dangerous and, until recently, a distinctively "American" method of resupply, underway replenishment calls for the service ship and the receiving ship to proceed on parallel courses at approximately 14 knots, often as close as 50 yards during which time fuel, ammunition cargo and even passengers are transferred. This type of resupply is practically unknown in the commercial sector, and consequently, the Navy has all the available expertise in this particular area. When several of the Navy's fleet support ships were put under civil service manning, extensive training for the civilian crews was required. Special ratings for the ship's manning scales were created under DOD's wage fixing authority, since similar job classifications were not available in the commercial sector. Thus, not only is the overall operation unique to the Navy, individuals trained to accomplish this task are found only in the Navy and Civil Service Community. Such factors were found to be fatal to the legality of contracts reviewed by the Comptroller General. More importantly, they indicate the existence of an employer/employee relationship under the Pellerzi/Mondello standards discussed above.

Because of the unique operations involved and the lack of available expertise, the Government would necessarily have the right to specify the qualifications needed by the contractor's employees and would probably want to reserve the right to reject or approve any prospective employee.

Although the Navy probably would not prepare the work schedules and assignments of the contractor's employees, those work schedules and assignments would be directly contingent upon the fluctuating operational needs of the fleet. The regular working hours and overtime of the employees would depend upon those of the fleet units which the contractor was servicing.

Needless to say, many replenishments are integral evolutions in the execution of confidential operation orders. Since national security is involved by reason of this confidentiality, the Government would certainly insist on retaining the right to remove employees from the job because of security requirements. Because these seamen would also represent the United States in foreign ports and their performance would affect the morale of the U. S. Navy, the right to remove them for misconduct ashore would also be retained by the Government.



Out of considerations of safety in the area, the Navy would also be responsible for advising the contractor of the number of seamen and the manner in which their functions would be performed. Such control over the contractor's employees cannot be escaped and seem to suggest the type of control which the Comptroller General, the CSC and the Courts found to be improper.

(2) Exercise of Command and Control - Since the resupply ship has strategic as well as logistic importance, the vessel necessarily becomes an integral part of the unit which it services. Generally, the senior officer of the squadron will issue a replenishment plan setting forth the time and place of the rendezvous, the method of replenishment and the tactical method by which it is to be accomplished. The supply ship cannot exercise any independent authority in this area except when the safety of the ship or crew is placed in jeopardy. When she is not part of a replenishment, the ship remains a unit of service squadron of the area in which it is operating and must respond immediately and directly to the needs of the Fleet. Because of the strategic role played by the fleet support ships, the Navy could not delegate to a commercial entity any measure of authority or discretion in the area of the overall replenishment program or in a particular replenishment exercise.

Since the entire replenishment operation would be under the tactical command of the senior line officer present afloat, there would be direct supervision over the performance of the contract-operator's personnel by the Navy both directly during the replenishment operations and indirectly by means of the replenishment proposals and plans. It is clear that each replenishment will be judged, not on the amount of cargo transferred, but on the actual performance in terms of the "smartness" of the tactical moves and the manner and speed with which the cargo is transferred.

Thus, the close cooperation between support ships and receiving ships and overall command control requires an integration of the support ship into the command structure of the fleet during both actual replenishment operations and strategic planning. This integration into the Navy's organizational structure cannot be escaped and strongly suggest the personal service nature of any contract for the operation of fleet support ships.

(3) Other Contractual Provisions - In order to perform, contractors would utilize Government-owned ships and other Government-furnished equipment. Such a contractual provision was important to the Comptroller General, the courts and the CSC in finding other contracts to be personal service contracts.

Continuing supervision of the Government is another element which has weighed the judicial scales in favor of finding a personal service contract. In the operating contract, the supervision exercised by the Navy would necessarily be on a continuing basis. Moreover, actual performance, e.g., number of replenishments, could not be quantified when the contract is signed; the responsibility of the contractor would necessarily be defined on a day to day basis as directed by the fleet commanders.

Although a fixed price contract could conceivably be awarded, it is doubtful that any prospective contract operator would accept that type of contract. Numerous escalation clauses would have to be added to protect the contractor from losing his profit. It is more likely that a cost reimbursable contract with fixed fee would be issued. The bulk of the payments made under a CRFF contract would be for wages, overtime, provisions and expenses. Such expenses would be directly

related to the amount of time worked by the crew, rather than to the amount of cargo delivered. Thus, the cost of the contract would be in direct proportion to employment of contractor's personnel. This fact, although hardly conclusive, is certainly one of the many elements in this type of situation which all point to a prohibited procurement of the contractor's personnel. This fact, although hardly conclusive, is certainly one of the many elements in this type of situation which all point to a prohibited contract for personal services.

### G. Distinction Between Fleet Support Ships and Tankers Under Contract Operation

There is a qualitative difference between the services rendered by fleet support ships under contract operation and those performed by tankers operated under a similar contractual arrangement. This difference is controlling in the determination that the tanker operations are not "personal service" contracts.

Tankers are required to carry cargo between ports. The amount of port calls made for loading and discharging will vary, but an approximation can be made on the basis of past experience. The role played by these tankers is certainly important in a strategic sense, almost as important as that played by fleet support vessels. However, there is not the same level of integration into fleet operations as is found in fleet support activity.

Performance of the contract operators of the tankers can be measured by objective standards, specifically the amount of cargo carried from point to point and the speed with which it is delivered. The contractor has a great amount of discretion over the manner in which the service is performed; the sole supervision exercised by the Navy is found in the various orders directing the operator to proceed to a certain port for loading and discharge. It is only rarely that a tanker will be integrated into a fleet unit for any type of strategic operations, making it most unlikely that a contract operated tanker would be under the tactical command of a fleet unit. Thus, the relationship between the contract operator and the Government created by the contract for the operation of tankers has more of the attributes of an independent contractor relationship than of an agency relationship.

Traditionally, the Navy has procured services of tankers from commercial entities through the use of time, voyage, and consecutive voyage charters. This past practice indicates that movement of tanker cargo has not been the responsibility of Navy or Civil Service employees. This is not the case with fleet support services.

For these reasons, contract operation of tankers and contract operation of fleet support ships can be distinguished.

## H. Conclusion

The inherent nature of fleet support service requires close supervision of the employees of a contract operator by the Navy Department. This supervision strongly suggests that contract operation of fleet support ships would be a contract for personal services which is prohibited both by ASPR and by present decisional law. It is strongly recommended that contract operation of fleet support ships be deleted as a viable option under the CNO study noted by reference (a), especially in the absence of appropriate enabling legislation.

TERENCE A. MCGINNIS



DEPARTMENT OF THE NAVY  
OFFICE OF THE GENERAL COUNSEL  
WASHINGTON, D. C. 20360

OGC/WLW:msr  
21 March 1977

MEMORANDUM FOR MR. I.M. BLICKSTEIN, CNO PROJECT OFFICER (OP 96)

Subj: Feasibility of Civilian Manning for Fleet Support Ships

1. At your request and in accordance with your March 7, 1977 memorandum, I have reviewed MSC Counsel's March 2, 1977 opinion which concluded that contracting-out the operation of fleet support ships would be prohibited absent specific congressional authority. I agree with Mr. Clapp's opinion based upon the preliminary information available to me at this time.
2. As you know, the ultimate issue to be resolved is whether the kind of contractual arrangement envisioned would pass muster as a non-personal service contract. Frankly, I doubt it. The inherent nature of the services sought would seem to necessarily require (at least indirectly) Government direction and supervision causing an unauthorized employer-employee relationship. The Federal courts, Attorneys General of the United States and the Comptroller General of the United States have not been reluctant to strike down such contracts as illegally made in contravention of the Civil Service Act and other Civil Service laws. Recently, the United States District Court for the District of Columbia in Lodge 1858, AFGE v. N.A.S.A., No. 3261-27, August 12, 1976, struck down several NASA contracts found to be de facto personal service in nature because of Government direction and supervision. This case is presently on appeal in the D.C. circuit and we intend to watch its progress closely in connection with this matter.
3. In order to avoid the strong likelihood of troublesome, time-consuming and expensive litigation (probably on behalf of disgruntled union representatives) if civilian manning of Navy fleet support ships were to be implemented by CNO, it is recommended that specific congressional legislation be sought. In this connection, we would be pleased to assist





you in developing a legislative package for submission to the Congress. Please do not hesitate to contact me if we can be of further assistance.

*Will Walsh, Jr.*

William L. Walsh, Jr.  
Assistant to the General Counsel

Copy to:  
Mr. Wilcox  
Cdr Paul Wille, Navy JAG Office  
Attn: Code 131





DEPARTMENT OF THE NAVY  
OFFICE OF THE GENERAL COUNSEL

Counsel for the  
Military Sealift Command  
Washington, D. C. 20390

M-7/TAM:jij/lak  
14 June 1977

MEMORANDUM FOR MR. IRVING BLICKSTEIN

Subj: Civilian Manning of Fleet Support Ships not certified by the Coast Guard

Encl: (1) M-4E/rha memo of 2 Jun 1977

1. As indicated in enclosure (1), none of the fleet support vessels presently being considered for civilian manning can meet the Rules and Requirements for Ship Construction as demanded by the United States Coast Guard (USCG) and the American Bureau of Shipping. Enclosure (1) further states that the costs of modifications or alterations to meet USCG certification and ABS classification would be prohibitive. Thus, any such changes are not considered feasible. If these vessels are manned by civilian crews under an operating contract, the failure to obtain certification by the Coast Guard or to maintain the vessels in the ABS classification will expose the Government to increased liability for seamen's personal injuries under the seaworthiness doctrine. The following discussion lends support to this conclusion.

a. Fleet support ships may be manned by civilian crews under two different methods--civil service manning or manning under a commercial operating contract. If the former is used, any seaman who is injured aboard the ship may bring a claim against the Government under the Federal Employees Compensation Act. Under the Act, the seaman's recovery is statutorily defined and limited and seaworthiness of the ship is not in issue. However, if the latter method of manning is utilized, an injured seaman may bring his claim directly against his employer alleging that the ship was unseaworthy and that the ship's unseaworthiness was the proximate cause of his injury. There is no limit to the amount of recovery in such instances.

b. Under present operating contracts, the Government has agreed to indemnify the contract operator for those claims normally covered by a standard commercial Protection and Indemnity insurance policy which would include claims for personal injuries. Thus, when a seaman is injured aboard an MSC contract operated tanker (which incidentally is Coast Guard certified), he may bring his action directly against the United States on the basis of both the indemnification provision and the fact that the ship is a public vessel of the United States. If MSC requires the contract operator to obtain P&I insurance, the Government would be ultimately responsible for paying the premiums either through direct reimbursement or through a higher per diem demanded by the operator. Since the

underwriters charge premiums which reflect their total outlay for claims as well as a generous amount of overhead, the Government has saved money through its self insurance program as has been reflected in several cost studies. Nonetheless, in order to defend these claims, the Government must clearly refute the seaman's allegations of unseaworthiness. However, there is a serious question as to whether an operator could secure P&I insurance on an uncertified ship.

c. Recently, the doctrine of unseaworthiness has become the principal vehicle for seamen to recover for injuries sustained while employed aboard a vessel. See Tetreault, Seamen, Seaworthiness and the Rights of Harbor Workers, 39 Cornell L.Q. 381 (1954); Chainlee, The Absolute Warranty of Seaworthiness: A History and Comparative Study, 24 Mercer L. Rev. 519 (1973); Gilmore & Black, The Law of Admiralty, Section 6-38 (1975). The concept, as it relates to personal injuries, contemplates that the ship's hull, gear, appliances, ways, appurtenances and manning will be reasonably fit for its intended service. See Mitchell v. Trawler Racer, Inc., 362 U.S. 539, 4 L.Ed. 2d 941, 80 S. Ct. 926 (1960). The injured seaman need not prove that the shipowner was negligent; he is simply required to prove by the preponderance of the evidence that the ship was unseaworthy and that the unseaworthy condition proximately caused his injury. See Tanzi v. Deutsche Dampfschiffahrts-Gesellschaft Hansa, 355 F. Supp. 432 (D.C.N.Y., 1973); McQuiston v. Freighters and Tankers Steamship Company, 217 F. Supp. 701 (D.C. La., 1963), aff'd 327 F.2d 746 (5th Cir. 1964).

d. Seaworthiness is essentially a relative term which may depend upon the circumstances in which the fitness of the vessel is questioned. Thus, while an absence of a rail on a ship may render her unseaworthy in one instance, in another circumstance, this defect may not result in such a finding. See Lester v. United States, 234 F.2d 625 (2d Cir., 1956); Norris, The Law of Maritime Personal Injuries, 3d, Section 298. Nonetheless, the duty of the shipowner to provide a seaworthy ship is absolute, continuing and nondelegable. See Mahnich v. Southern S.S. Co., 321 U.S. 96, 88 L.Ed. 561, 64 S. Ct. 455 (1944). Moreover, it is not enough that the shipowner exercises due diligence to provide a seaworthy ship; he is at all times to furnish a seaworthy vessel including sound and adequate appliances, gear and equipment. See H. A. Scandrett, 87 F.2d 708 (2d Cir. 1937).

e. By various statutes (14 USC 1 et seq., 46 USC 375; 46 USC 416; 46 USC 170; 46 USC 481; 46 USC 85a, 88a), the Commandant of the Coast Guard has been empowered to establish regulations with regard to safety rules and procedures as well as regulations regarding the adequacy, quality and fitness of material and manpower. In implementing its statutory obligation, the Coast Guard, after inspection, may certify those vessels whose construction and safety gear meet the regulations set forth in Volume 46 of the Code of Federal Regulations. Courts have regarded these regulations as representing "an accepted standard of care" for the shipowner. See Petition of Skibs A/S Jolund, 250 F.2d 777 (2d Cir. 1957). But even more importantly, the Courts have closely examined these regulations in their determinations of the seaworthiness of vessels.

i. In McHoney et al. v. Marine Navigation Company, 233 F.2d 769 (4th Cir. 1956), several longshoremen brought suit against a shipowner after they received serious bodily injury as a result of a flash fire which occurred during the loading of the vessel. The plaintiffs alleged both unseaworthiness and negligence and based their allegations upon the failure of the shipowner to abide by the regulations of the Coast Guard which required a fresh water supply on cargo vessels loading sulphur. It is interesting to note that the Fourth Circuit Court of Appeals took great pains to analyze the regulation in order to determine if it applied to the particular circumstances of the case before it. Although the Court did find for the defendant, it did so only after it was clearly convinced that the regulation did not mandate a water supply during the off-loading of sulphur.

ii. In Johannesen v. United States, 136 F. Supp. 786 (E.D.N.Y. 1956), plaintiff brought suit against the United States for damages sustained when a switch on an electric motor winch on which he was working was activated causing the handle to reverse and injure him. Johannesen's allegations of unseaworthiness rested on the fact that a disengaging device which would have prevented the accident was approved by the Coast Guard and prescribed for use aboard merchant vessels. However, since the Coast Guard regulation became effective after the incident, the Court dismissed the claim. Nonetheless, it may be inferred from the Court's reasoning that the plaintiff would have stated a claim upon which relief could have been granted had the regulation been effective at the time the plaintiff was injured.

iii. In Kernan v. American Dredging Company, 355 U.S. 426, 2 L.Ed. 2d 382, 78 S. Ct. 394 (1957), a Coast Guard regulation which was violated by the vessel on which plaintiff was employed, was instrumental in the Court's finding the shipowner liable for failure to provide a seaworthy vessel. In this case, navigation lanterns which were hung three feet above water rather than eight feet as prescribed by the Coast Guard ignited causing fire to envelop a tugboat killing two seamen. In another case, Sevinour v. Oceanic Navigating Company, 453 F.2d 1185 (5th Cir. 1972), the Court held that Coast Guard Regulations set an accepted standard of care in the maritime field and any violation of such regulations which proximately causes an injury to a seaman or longshoreman clearly supports a finding of unseaworthiness or negligence and justifies the imposition of liability against the vessel owner.

iv. In many other instances, the Courts have looked to safety standards set by the marine industry and accorded them recognition in determining the vessel owner's liability. See D/S Ove Skou v. Hebert, 365 F.2d 341 (5th Cir. 1966); DeLanouvelle v. Simonsen 437 F.2d 597, (5th Cir. 1971); Norris, *supra*, Section 315. Thus, the fact that fleet support ships do not meet the Rules and Regulations set by the American Bureau of Shipping may also be a factor in finding the Government liable to a seaman claiming damages resulting from the unseaworthiness of a vessel.

M-7/TAM:jj/lak  
14 June 1977

2. Thus, as indicated in the foregoing discussion, the failure of the fleet support ships to meet Coast Guard Certification and ABS standards will lessen the burden of proof for injured seamen who base their claims upon allegations of unseaworthiness. The ultimate result will be substantial costs to the Government over and above the experience to be expected from ships which are certified by the Coast Guard.

3. In addition to the increased exposure of the Government for seamen's claims, consideration must also be given to two other aspects of this same problem; the impact of lack of certification upon the ability of an operator to crew fleet support ships with qualified personnel and the adverse public relations inuring to the Navy in the event of a major casualty.

4. For the foregoing reasons, contract manning of uncertified ships is not considered an acceptable alternative to military or civil service manning.

*Dudley J. Clapp, Jr.*  
DUDLEY J. CLAPP, JR.



M-4E/rha  
2 June 1977

MEMORANDUM

From: M-4E  
To: M-7

Subj: Civilian Manning of Navy Auxiliary Ships - Seaworthiness standards and construction practices

Ref: (a) Discussion between M-4E (C. Whitestone) and M-7 (D. Clapp) of 31 May 1977

Encl: (1) List by Class of auxiliaries considered for civilian manning

1. Enclosure (1) is forwarded with notations per reference (a).

2. The ships noted as Navy indicate construction IAW "Specs for the Construction of Naval Vessels". The construction requirements vary considerably and in most cases would not meet the Rules and Requirements for Ship Construction as demanded by the American Bureau of Shipping and the U S Coast Guard.

3. Modification and or alterations to meet USCG certification and ABS classification is cost prohibitive and not considered feasible.

4. The ship marked (MARAD) C-3 has been so altered and cut up so that conversion to ABS & USCG standards is impractical.

  
C.J. Whitestone

<u>CLASS</u>	<u>DESIGN</u>
AD 37	Navy
AE 21	Navy
AE 23	Navy
AE 26	Navy
AFS 1	Navy
AOE 1	Navy
AOR 1	Navy
AR 8	Navy
ARS 39	Navy
AS 31	Navy
AS 33	C-3 (MARAD)
AS 36	Navy
ASR 21	Navy
ATS 2	Navy





DEPARTMENT OF THE NAVY  
COMMANDER MILITARY SEALIFT COMMAND  
WASHINGTON D. C. 20390

REFER TO

Ser 50M31  
4 OCT 1977

MEMORANDUM FOR THE CHIEF OF NAVAL OPERATIONS (OP-96)

Subj: Increased Use of Civilian Manning of Fleet Support Ships Study

Encl: (1) COMSC Counsel Memorandum of Law re: A comparison of the disciplinary control over personnel aboard Fleet Support Ships under alternative modes of operation

1. Enclosure (1) is an excellent treatise on the degree of disciplinary control which can be exercised over Navy military, Navy civil service, and commercial contract personnel aboard fleet support ships in peacetime, contingency, and wartime.

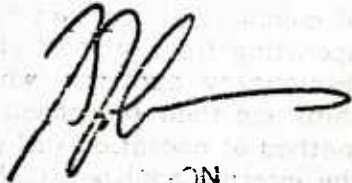
2. It is recommended that enclosure (1) be incorporated in the final report of subject study.

Copy to:

CNO (OP-04)

CNO (OP-03)

JAG



ON  
er Admiral, U. S. Navy  
Commander  
Military Sealift Command

M-7/TAM:lak  
29 September 1977

## MEMORANDUM OF LAW

Subj: A comparison of the disciplinary control over personnel aboard Fleet Support Ships under alternative modes of operation

Ref: (a) M-7/TAM:lak memo of 28 Feb 1977

Encl: (1) Graph - A comparison of disciplinary control exercised over Masters/Commanding Officers  
(2) Graph - A comparison of disciplinary control over seamen  
(3) Graph - Delegation of Authority for Disciplinary Actions (CMPI 750.8)  
(4) Graph - Schedule of Charges and Penalties

1. Various modes of operation have been proposed for the fleet support ships. Presently, as vessels "in commission," the fleet support ships are manned by Navy crews. However, once these ships are designated vessels "in service" and are placed under the operational control of Commander, Military Sealift Command (MSC), they may be manned either by civil service crews or by civilian employees of commercial contract operators. When a comparison of these various methods of operating fleet support ships is made, some consideration should be given to the disciplinary authority which the operational commander may exercise over the ships and their personnel. As will be discussed below, the inherent nature of each method of operation will permit a certain level of disciplinary control. In addition, the international political situation, namely war, peace or contingencies, will also affect the degree of disciplinary authority which the operational commander may exercise.

2. In the context of the following discussion, some references must be made to the difference between disciplining a Master or Commanding Officer and disciplining seamen. Although improper conduct, refusal to obey orders, or insurrection on the part of either the Master or the crew will adversely impact on the operational readiness of the ship, the role of the Master or Commanding Officer is much more critical. Where appropriate, his conduct will be specifically addressed.

### A. Contract Operation

Fleet support ships may be operated by commercial shipping companies under contract to MSC, provided there is specific statutory authority to enter into such a contract. See reference (a). In order to crew the vessel, the shipping companies hire merchant seamen who become employees of the company. The seamen are not under the Civil Service Commission nor are they bound by civil service regulations. Their employment contract is reflected in the Shipping Articles which they sign pursuant to 46 USC 564.

1. Peacetime

Since the employees of the contract operator are not considered employees of the Navy, the Navy through an operational commander cannot exercise any direct disciplinary control over the seamen. However, if improper conduct on the part of the crew impeded the mission of the vessel, the Navy could consider the operator to be in breach of his contract. Assuming the contract contained a termination of default clause, the Navy could seek the excess cost of reprocurring the services.

The Master of the contract operated vessel is not without some disciplinary control of his crew. Under Chapter 18 of Title 46 of the United States Code, entitled Merchant Seamen, Section 701 permits either the Master or the courts to impose certain penalties for various offenses. Part of the statute is set forth below:

First. For desertion, by forfeiture of all or any part of the clothes or effects he leaves on board and of all or any part of the wages or emoluments which he has then earned.

Second. For neglecting or refusing without reasonable cause to join his vessel or to proceed to sea in his vessel, or for absence without leave at any time within twenty-four hours of the vessel's sailing from any port, either at the commencement or during the progress of the voyage, or for absence at any time without leave and without sufficient reason from his vessel and from his duty, not amounting to desertion, by forfeiture from his wages of not more than two days' pay or sufficient to defray any expenses which shall have been properly incurred in hiring a substitute.

Third. For quitting the vessel without leave, after her arrival at the port of her delivery and before she is placed in security by forfeiture from his wages of not more than one month's pay.

Fourth. For willful disobedience to any lawful command at sea, by being, at the option of the master, placed in irons until such disobedience shall cease, and upon arrival in port by forfeiture from his wages of not more than four days' pay, or, at the discretion of the court, by imprisonment for not more than one month.

Fifth. For continued willful disobedience to lawful command or continued willful neglect of duty at sea, by being, at the option of the master, placed in irons, on bread and water, with full rations every fifth day, until such disobedience shall cease, and upon arrival in port by forfeiture, for every twenty-four hours' continuance of such disobedience or neglect, of a sum of not more than twelve days' pay, or by imprisonment for not more than three months, at the discretion of the court.

Sixth. For assaulting any master, mate, pilot, engineer, or staff officer, by imprisonment for not more than two years.

Seventh. For willfully damaging the vessel, or embezzling or willfully damaging any of the stores or cargo, by forfeiture out of his wages of a sum equal in amount to the loss thereby sustained, and also, at the discretion of the court, by imprisonment for not more than twelve months.



Eighth. For any act of smuggling for which he is convicted and whereby loss or damage is occasioned to the master or owner, he shall be liable to pay such master or owner such a sum as is sufficient to reimburse the master or owner for such loss or damage, and the whole or any part of his wages may be retained in satisfaction or on account of such liability, and he shall be liable to imprisonment for a period of not more than twelve months.

The Master, however, can be either fined or imprisoned, if in his zeal to discipline he either ". . . flogs, beats, wounds or without justifiable, imprisons or withholds suitable food and nourishment or inflicts (upon his crew) any corporal or other cruel and unusual punishment . . ." 18 USC Section 2191.

All seamen, whether or not they are considered merchant seamen within the meaning of Chapter 18 of Title 461, are prohibited by statute from engaging in mutiny or endeavoring to revolt or mutiny. For the former activity, a seaman may be fined not more than \$2,000 or imprisoned not more than ten years, or both (18 USC Section 2193); for the latter misconduct, the seaman may be fined not more than \$1,000, or imprisoned for not more than five years, or both (18 USC Section 2192).

In order to be accused of engaging in revolt or mutiny, a seaman must be found to have resisted the free and lawful exercise of the Master's authority, to have deposed the Master from his command and to have transferred the Master's power to a third person who usurped the Master's power. See Norris, The Law of Seamen, 3rd Ed., Section 256. Endeavoring the revolt or mutiny is a lesser offense, but is more than a mere act of disobedience. It has been defined by an early nineteenth century court as an effort ". . . to stir up a general disobedience or resistance to the authority of the officers of the ship . . . an attempt to excite others of the crew to a general resistance or disobedience of orders, or a general neglect and refusal of duty." United States v. Smith, 27 F. 1167 (F. Cas. No. 16, CC Mass. 1816).

All "maritime" crimes which are committed on the high seas or in territorial waters of the United States are within the admiralty and maritime jurisdiction of the Federal District Courts. No military court or individual in authority may make a binding determination of guilt.

With regard to the disciplining of a Master of a contract operated vessel, it appears that the shipowner may resort only to dismissal. Public policy has long dictated that the shipowner may discharge the Master and reclaim possession of the ship, even though there may not be sufficient cause. See Norris, The Law Of Seamen, 3rd Ed., Section 458; Lombard SS Co. v. Anderson, 134 F. 568 (4th Cir. 1904). However, if the dismissal is in violation of his contract with the shipowner, the Master has a common law right to seek damages for breach of contract.

## 2. Wartime and other Contingencies

Section 802 of Title 10, USC, subjects a number of categories of individuals to the Code of Military Justice and, thus, to the jurisdiction of a courts-martial. Included within the statute are:

... (10) In time of war, persons serving with or accompanying an armed force in the field.

(11) Subject to any treaty or agreement to which the United States is or may be a party or to any accepted rule of international law, persons serving with, employed by, or accompanying the armed forces outside the United States and outside the following: The Canal Zone, Puerto Rico, Guam, and the Virgin Islands.

With reference to the term "in the field," as used in subpart (10) of Section 802, the courts have concluded that commercial ships operating with combatants would be included within the ambit of the statute. Thus, in In Re Berube, 54 F. Supp. 252 (D.C. Ohio, 1944), it was held that a merchant ship that was part of a large convoy transporting military supplies to Africa through submarine infested waters was "in the field" within the provision of Section 1473(d) (the predecessor to this provision) so as to subject a merchant seaman to courts-martial for violating the former Articles of War. See also McCone v. Kilpatrick, 53 F. Supp. 80 (D.C. Va. 1943).

There has been a marked difference between the decisions handed down during World War II and those of more recent vintage. Without exception, the courts have restricted the reach of subsection (10) thereby limiting the situations in which civilians "serving with or accompanying an armed force in the field" may be subjected to military law.

In Latney v. Ignatius, 135 U.S. App. D.C. 65, 416 F.2d 821 (1969), the Circuit Court of Appeals for the District of Columbia held that a court-martial did not have jurisdiction to try an American merchant seaman charged with the murder of a crew member in a bar while their ship was unloading cargo in Vietnam. The rationale used by the court in arriving at its decision was that the seaman was not sufficiently assimilated into the military operation.

A further limitation on the jurisdiction of the courts-martial was fashioned by the Court of Claims in Robb v. United States, 456 F.2d 768 (1972). In that case, the plaintiff, the administratrix of a civilian employee of the Government, sought to recover a fine imposed upon the employee by a general court-martial for importing diamonds into Vietnam for unauthorized resale and for using Military Payment Certificates to purchase postal money orders in excess of his monthly salary. The court, noting with approval the decision of the U.S. Court of Military Appeals in United States v. Averette, 19 USCMA 363, 41 CMR 363 (1970), held that under Clause (10) of Section 802, jurisdiction of courts-martial may be extended over civilians serving or accompanying the armed forces in the field only during a "time

of war" formally declared by Congress. Thus, when the Latney case and Robb case are read together, it must be concluded that only those civilians directly involved in a military operation during a formally declared war may be tried without jury in accordance with military law.

The decisions previously discussed cast considerable doubt on the constitutionality of Clause (II) of Section 802 of Title 10. That provision does not require a state of war to exist before court-martial jurisdiction can be extended over civilians accompanying the armed forces; rather, the civilian need only be serving with, employed by or accompanying the armed forces outside the U.S. or other areas, subject to any treaty to which the United States is a party or to any accepted rule of international law. However, in addition to the Robb and Latney cases whose language discussing Clause (10) might be apropos to Clause (II), several Supreme Court cases have emasculated this particular clause.

In Reid v. Covert, 354 U.S. 1, 1 L.Ed 2d 1148, 77 S. Ct. 1222 (1956), the court-martial of a civilian military dependent under Clause (II) for a capital offense was found to be unconstitutional. A spate of Supreme Court decisions in 1960 held that the extension of courts-martial jurisdiction over civilians for other classifications of offenses could not meet constitutional muster: Kinsella v. United States, 361 U.S. 234, 4 L.Ed 2d 268, 80 S. Ct. 297 (1960) prohibiting court-martial of civilian military dependant for non-capital offenses; Grisham v. Hagan, 361 U.S. 278 4 L.Ed 2d 279, 80 S. Ct. 300 (1960) prohibiting court-martial of civilian employee of the Army for a capital offense; McElroy v. United States, 261 U.S. 281, 4 L.Ed 282, 80 S. Ct. 305 (1960) prohibiting court-martial of civilian employee of the Air Force for a non-capital offense.

In the Reid case, supra, the court observed:

The exigencies which have required military rule on the battlefield are not present in areas where no conflict exists. Military trial of civilians "in the field" is an extraordinary jurisdiction and it should not be expanded at the expense of the Bill of Rights. We agree with Colonel Winthrop, an expert on military jurisdiction, who declared: "a statute cannot be framed by which a civilian can lawfully be made amenable to the military jurisdiction in time of peace. . ." 354 U.S. at 35.

Despite this language, Clause (II) was not found to be constitutionally infirm on its face. Recognizing that in the exercise of its constitutionally delegated power to regulate land and naval forces Congress may permit the court-martial of civilians, the court stated that the test for such jurisdiction is the status of the civilian, namely, whether the accused in the court-martial proceeding is a person who can be regarded as falling within the term "land and naval forces." Kinsella v. United States, 361 U.S. at 241. However, when the decisions in the Robb and Latney cases are considered, it becomes extremely doubtful that the extension of court-martial jurisdiction over civilians in time of peace will ever be permitted by the courts.



The discussion of the jurisdiction of courts-martial over seamen in time of war and contingency operations is equally applicable to Masters. The role of the Master, while certainly more visible and important, would not make him more amenable to process under military law.

## B. Civil Service Mariners

### 1. Peacetime

An extensive and detailed discussion of disciplinary actions involving civil service seamen is contained in Instruction 750 of the Civilian Marine Personnel Instructions. The authority for establishing such regulations is contained in a number of statutes, i.e., The Lloyd-La Follette Act, the Veterans' Preference Act of 1944, the Classification Act of 1949, as well as in the rules and Regulations of the Civil Service Commission as published in Volume 5 of the Code of Federal Regulations. The instructions also incorporate the various statutes relating to the conduct of seamen as discussed above.

As indicated in enclosure (3), the responsibility for discipline afloat rests with the Master of the vessel; the Master himself may be disciplined only by the commander of the home port. In this connection, enclosure (4) reflects the types of charges that may be lodged against the seamen and the penalties that can be imposed by the official authorized to do so.

In accordance with civil service regulations, MSC has also adopted both formal and informal hearings to inform the employee about a number of items, namely, the complaint or charge, the evidence which supports the charge and the penalty which is being considered. At this time, the employee may present his defense and call witnesses to testify in his behalf. The ultimate purpose of the hearing is to develop all pertinent facts relating to the incident. Whether an informal or formal hearing is to be convened will be determined by the nature of the penalty which may be imposed. For the formal hearings, the CMPI clearly sets forth the procedures by which the hearing will be conducted. The instructions also detail procedures to be followed for initiating action against employees.

As with all civil service employees, the mariners have a right to an appeal for the disciplinary action taken by the Master or the Commander of home port. These rights are set forth in Section 6 of CMPI 750.

The Commander of the home port may impose penalties against the Master. Like the mariners, the Master is entitled to hearings and has the right to appeal any disciplinary action taken against him.

### 2. Wartime and other Contingencies

Since the UCMJ can only extend to civilians integrated into the operating forces during a formally declared war, the CMPI would provide the parameters of the disciplinary control which could be exercised by Masters and home port Commanders during contingency operations.

As previously discussed, the UCMJ can be invoked to discipline civilians serving with or accompanying the armed forces only during wars which are formally declared by Congress. Moreover, the courts will look closely at the status of the civilian tried under courts-martial to determine whether or not he or she is sufficiently integrated into the operating forces to warrant application of the UCMJ. Since trial by courts-martial forecloses the constitutional right of trial by jury, it will only be in rare circumstances that a court will uphold a conviction of a civilian under the UCMJ.

### C. Military

During times of war and peace, all Navy personnel both those in command and those who are members of the crew are under the Uniform Code of Military Justice as required by 10 USC Section 802.

3. While the import of this memorandum is a comparison of disciplinary controls over personnel, the overall performance of a crew member from the point of view of quality control should also be considered. There are situations wherein a seaman is not performing with the degree of efficiency necessary for a particular operation. Nonetheless, his conduct is not clearly within the prohibited activities detailed in either the statutes, civil service regulations, or the Uniform Code of Military Justice. The discipline of military personnel for inadequate performance is understood to be a traditional prerogative of the armed forces; however, the difference in the methods of insuring quality control over civil service mariners and the merchant seamen employed by contract operators should be explored.

(a) CIVIL SERVICE MARINERS: Since the Government, as employer of civil service mariners, is not bound by collective bargaining agreements, it has a greater amount of flexibility in assigning personnel to ships and overseeing their performance. The Government through Military Sealift area commands has complete discretion as to which individuals will serve aboard units of its nucleus fleet. Once the mariner is on board the vessel, his performance is evaluated and his subsequent promotion will depend upon the results of these appraisals. Since he is subject to the CMPI, he may receive letters of reprimand or censure, conditional suspensions or demotions which may serve as incentives to improved performance before the ultimate penalty of dismissal is imposed. In addition, the Government may arbitrarily remove any mariner or Master from one ship and reassign him to another if the needs of the Government so dictate; the Government may also remove any individual from a vessel and assign him to an area command receiving station or place him on annual leave, pending disciplinary action. During this time, the individual still collects his pay and receives any benefits accruing to him.

(b) MERCHANT SEAMEN: According to maritime practice, the merchant seaman is hired by the contract operator for one particular voyage as detailed in his shipping articles. Virtually all merchant seamen are members of maritime unions and are protected by collective bargaining agreements with the various shipping companies and operators. It is union practice that the most senior man has a right to first refusal for any posted position for which he is qualified. Neither the

Government nor the contract operator may refuse him the position or arbitrarily reassign him once he reports aboard the vessel. Consequently, there is less flexibility for the Government with regard to assignments. The performance of the individual on board is controlled by the ship's officers who may either use threats to induce efficiency or resort to dismissal but only in accordance with the collective bargaining agreements and maritime law. Some performance standards could be written into the operating contract; however, it is most doubtful that the operating contract could materially change any provision of the collective bargaining agreements which ultimately control the conduct of the merchant seaman.

#### 4. Conclusion

From the standpoint of disciplinary control, the most effective mode of operation of fleet support ships to ensure timely and rapid response is manning with either Navy personnel or civil service mariners. While disciplinary control over civil service mariners is somewhat less than that exercised over Navy crews, the CMPI does include a wide range of penalties which may be imposed on personnel for violation of regulations. Nonetheless, required procedures for formal hearings and rights of appeal do give the mariners a modicum of independence from their superiors. In times of formally declared wars, the UCMJ may be applied to civil service mariners, but only if they have been closely integrated into the operating forces in the field.

Statutory authority and traditional maritime practice would give the operating commander some degree of disciplinary control over civilian employees of contract operators. However, this control pales by comparison with the control that may be exercised over Navy personnel and civil service mariners. In peacetime and contingency operations, the Government would be forced to resort to contractual remedies to ensure adequate performance of the employees of contract operators. With this mode of operation, there would be no direct access lines between Government and crew members through which disciplinary control could be asserted by the Government. In formally declared wars, the UCMJ could be applied, but, as previously discussed, only in rare situations where the status of the employee clearly marks him or her as part of the armed forces operating in the field.

  
TERENCE A. MCGINNIS



**MATRIX  
OF THE MECHANISMS UNDER WHICH  
DISCIPLINARY CONTROL MAY BE EXERCISED  
OVER PERSONNEL ABOARD  
FLEET SUPPORT SHIPS**

MASTERS/COMMANDING OFFICERS

NAVY MILITARY PERSONNEL	CIVIL SERVICE MARINERS		EMPLOYEES OF CONTRACT OPERATORS
	1) Removal from ship	2) Discharge pursuant to civil service regulations (CMPI)	
UCMJ	3) Performance ratings		Discharge through the contract operators
UCMJ	1) Removal from ship	2) Discharge pursuant to civil service regulations (CMPI)	Discharge through the contract operators
	2) Discharge pursuant to civil service regulations (CMPI)	3) Performance ratings	
UCMJ		UCMJ*	UCMJ*

PEACETIME

CONTINGENCY  
OPERATIONS  
(VIETNAM, BERLIN  
CRISIS, ETC.)

WAR  
DECLARED  
BY CONGRESS

\*Before the uniform code of military justice can be applied to civilians in time of war, the civilians must be integrated into the operating forces. When they are not so integrated, civilians would still be subject to the statutes or regulations which control their activities during times of peace.

MATRIX  
OF THE MECHANISMS UNDER WHICH  
DISCIPLINARY CONTROL MAY BE EXERCISED  
OVER PERSONNEL ABOARD  
FLEET SUPPORT SHIPS

	NAVY MILITARY PERSONNEL	SEAMEN CIVIL SERVICE MARINERS	EMPLOYEES OF CONTRACT OPERATORS
PEACETIME	UCMJ	1) Civil service regulations (CMPI) 2) Statutes prohibiting mutiny and revolt 3) Performance ratings	1) Statutes imposing penalties for offenses committed by merchant seamen 2) Statutes prohibiting mutiny and revolt
CONTINGENCY OPERATIONS (VIETNAM, BERLIN CRISIS, ETC.)	UCMJ	1) Civil service regulations (CMPI) 2) Statutes prohibiting mutiny and revolt 3) Performance ratings	1) Statutes imposing penalties for offenses committed by merchant seamen 2) Statutes prohibiting mutiny and revolt
WAR DECLARED BY CONGRESS	UCMJ	UCMJ*	UCMJ*

\*Before the uniform code of military justice can be applied to civilians in time of war, the civilians must be integrated into the operating forces. When they are not so integrated, civilians would still be subject to the statutes or regulations which control their activities during times of peace.

## DELEGATION OF AUTHORITY FOR DISCIPLINARY ACTIONS

PENALTY	OFFICIAL AUTHORIZED TO IMPOSE PENALTY	
	I. MASTER (for ship's personnel)*	II. COMMANDER, HOME PORT
1. Reprimand	Yes	Yes
2. Suspension (including conditional suspension)	Yes (for 30 days or less)	Yes
3. Logging	Yes	No
4. Demotion	No	Yes
5. Removal	No	Yes

\*See note 4 below.

## NOTES

1. Only the Commander, home port, may take disciplinary action involving Masters.
2. The Master is authorized and required to take or initiate disciplinary action against Department Heads.
3. Only Masters may impose log penalties.
- \*4. The Industrial Relations Officer of the home port command is authorized to impose the same penalties as the Master against marine personnel in the Receiving Branch except that he may not log.
5. All responsible supervisors may orally admonish subordinate employees.
6. The Industrial Relations Officer may not sign any personnel action forms (SF 50) involving discipline except when taking action on matters within his delegated authority against employees under his own supervision. However, in cases of suspension, the Industrial Relations Officer may sign the Standard Form 50 as a purely confirmatory action; i.e., if the Standard Form 50 is executed after the suspension has been effected by the Master.



A CHARGES	C SCHEDULE OF CHARGES AND PENALTIES				F REMARKS
	B 1ST OFFENSE MAXIMUM PENALTY	C 2ND OFFENSE MINIMUM PENALTY	D 3RD OFFENSE MINIMUM PENALTY	E MAXIMUM PENALTY	
1. Description.	Removal. (Mandatory)				Employee will forfeit all pay due for the voyage.
2. Unauthorized absence from the ship or absence after authorized leave has expired.	*Log for period equal to the absence not to exceed 2 days' log.*	Log for a period equal to the absence not to exceed 2 days' log.*	30-day suspension.	Removal.	Instead of the log penalties specified in this section of the Schedule, pay may be forfeited for an amount sufficient to defray any expenses which shall have been properly incurred in the care of a substitute engaged to the actual cost of transportation to the ship and back to the ship. If the employee misses the sailing of the ship he shall be charged with that offense and placed in a non-pay status for remainder of voyage or loss he returns to duty in the ship or is placed in the receiving branch available for duty. Suspensions in such cases may be reduced in light of period in non-pay status.
(a) Unauthorized absence from the Receiving Branch.	2-day suspension for each day or portion thereof of absence.	10-day suspension.	30-day suspension.	Removal.	
(b) Prolonged unauthorized absence (more than 5 days).	Removal.	30-day suspension.	Removal.	Removal.	
3. Missing the sailing of the ship.	Removal.	10-day suspension.	30-day suspension.	Removal.	Either charge 42 or 43, or both, may be used in lieu of a charge of desertion where the circumstances warrant such action.
4. Reporting after presailing muster.	Removal.	10-day suspension.	30-day suspension.	Removal.	
5. Willful disobedience to a lawful command at sea.	Removal. (If log penalty is to be imposed, 4-day log is authorized.)	4-day log or 10-day suspension.	30-day suspension.	Removal.	The offender may be confined until such discipline shall cease. Pay does not accrue to offender during period of confinement. See 3-3g.
6. Willful disobedience to a lawful command in port.	Removal.	10-day suspension.	30-day suspension.	Removal.	The offender may be confined until such discipline shall cease. Pay does not accrue to offender during period of confinement. See 3-3c.
7. Continued willful disobedience to a lawful command or continued willful neglect of duty at sea.	Removal. (Mandatory)				
8. Failure to comply with Ship's Orders.	Removal.	10-day suspension.	30-day suspension.	Removal.	Upon conviction, offender may be imprisoned not more than 2 years.
9. Assaulting any master, mate, pilot, engineer or other officer.	Removal.	Removal.			
10. Willfully damaging the ship or her equipment, or embezzling or willfully damaging any of her stores or cargo.	Loss of pay equal to the loss sustained and removal.	Loss of pay equal to the loss sustained and 30-day suspension.	Loss of pay equal to the loss sustained and removal.		Whoever willfully injures or commits depredation against any property of the United States, shall be punished as follows: If the damage to be repaired exceeds the sum of \$100.00, by a fine of \$2,000 or more, \$10,000 or imprisonment for not more than 10 years, or both; if the damage to such property is not over \$100.00, by a fine of \$100.00, by a fine of not more than \$1,000, or by imprisonment for not more than one year, or both. (62 Stat. 764).
11. Smuggling.	Removal. (Mandatory)				For any act of smuggling for which the offender is convicted and whereby loss or damage is sustained to the master or MSTs, such a sum as is sufficient to reimburse the master or MSTs for such loss or damage may be retained from the offender's wages in satisfaction or in account of such liability. The offender is also liable to imprisonment for not more than 12 months.
12. Conviction by civil or other duly constituted authorities, except for minor misdemeanors.	Removal.	Removal.			
13. Conduct prejudicial to the maintenance of good order or discipline.	Removal.	10-day suspension.	30-day suspension.	Removal.	
14. Conduct unbecoming a government employee.	Removal.	10-day suspension.	30-day suspension.	Removal.	

M-7/TAM/jij  
1 December 1977

MEMORANDUM OF LAW

Subj: Disciplinary control of the Coast Guard over personnel  
aboard Fleet Support Ships under alternative modes of  
operation

Ref: (a) M-7/TAM:lak Memo of Law of 29 Sep 1977 w/encls

1. Reference (a) compared the types of disciplinary control that could be exercised by a military commander over personnel aboard fleet support ships under alternative modes of operation. The role of the Coast Guard in the discipline of licensed and unlicensed marine personnel was not discussed since the Coast Guard was considered to be outside the direct operational chain of command. However, by statute, specifically 46 USC 239, the Coast Guard does have jurisdiction to investigate and to take punitive or remedial action over licensed or certificated personnel for acts of incompetency and misconduct. 1/

2. Section 239 of Title 46 of the United States Code authorizes the Commandant of the Coast Guard (Commandant) to prescribe rules and regulations for the investigation of marine casualties and accidents in order to determine "if any incompetence, misconduct, unskillfulness or willful violation of the law on the part of any licensed officer-seaman caused, or contributed to the cause of . . . (the) casualty." The statute also gives the Coast Guard the right

1/ Sections 226, 228 and 229 of Title 46 of the United States Code also grant the Coast Guard to suspend or revoke the licenses of captains, mates and engineers, respectively, upon "satisfactory proof of bad conduct, intemperate habits" and other indications of an inability to perform. Violations of the provisions of Title 52 of the Revised Statutes are also made grounds for revocation or suspension of licenses in each of these sections. Title 52 of the Revised Statutes, which has been incorporated into the United States Code, includes a number of sections regulating not only merchant marine vessels but also the conduct and qualifications of those serving aboard such vessels. However, in order to exercise the authority granted by Sections 226, 228 and 229, the Coast Guard must have the ability to investigate both incidents and individuals which has been delegated by Congress through enactment of Section 239. Therefore Section 239 will be considered the legislative basis for the jurisdiction of the Coast Guard over all merchant marine personnel.

to investigate alleged violations of statutes applicable to merchant mariners as well as to make inquiry into all cases of incompetence or misconduct committed by a licensed officer or certified seaman whether or not such incompetence or misconduct contributed to any marine casualty or accident. Under the statute, the Commandant may either suspend or revoke the license or certificate of any individual found to be incompetent, or to have engaged in misconduct, or to have violated relevant statutes.

3. The Commandant has issued regulations pursuant to his statutory authority detailing the acts of incompetency, misconduct, negligence, the willful violations of law and the types of drug abuse which may give rise to investigations. These regulations are codified in 46 CFR Part 5. Professional qualifications necessary for licenses and certifications are also set forth in 46 CFR Part 10. Formal hearings are conducted by Coast Guard Hearing Examiners whose decisions are final. However, all decisions are subject to appeal to the Commandant.

4. In a very real sense, the Congress has delegated to the Coast Guard the power to adjudicate cases involving the private rights of merchant seamen. In order to avoid abuse of the discretion inherent in any such adjudication, the hearings conducted by the Coast Guard are governed by the Administrative Procedure Act, 5 USC Sections 500 et seq. (APA). The APA ensures, among other things, that the individual subject to an administrative adjudication will receive substantive due process and that an appeal to the courts may be had if a decision adverse to the individual is rendered. However, in reviewing the decisions of the Coast Guard Hearing Examiners, the courts will not conduct a hearing de novo, but merely "... determine whether the administrative decision is supported by substantial evidence and also whether in any controlling degree it is 'not in accordance with law.'" O'Kon v. Roland, 247 F. Supp. 743, 746 (DCNY 1965).

5. There are restrictions on the authority by the Commandant over marine personnel as the following case illustrates. Under the Magnuson Act, 50 USC Section 191(b) the President was authorized, if he found "the security of the United States is endangered by . . . subversive activity," to issue

M-7/TAM/jij  
1 December 1977

rules and regulations "to safe-guard against destruction, loss or injury from sabotage or other subversive acts" all vessels "in the territories or waters subject to the jurisdiction of the United States." Under this grant of authority, the President issued regulations giving the Commandant of the Coast Guard authority to withhold validation of any permit or license unless he was satisfied that "the character and habits of life of such person are such to authorize the belief that the presence of the individual on board would not be inimical to the security of the United States." When the Coast Guard declined to process mariner's application for validation of his mariner's certificate when he refused to answer a questionnaire concerning his attitude toward the United States, the mariner brought suit alleging that the provisions of the Magnuson Act in question and the Commandant's actions thereunder were unconstitutional. Holding that the Magnuson Act did not give the President express authority to set up a screening program for personnel on merchant vessels of the United States, the Supreme Court refused to conclude that safeguarding vessels and waterfront facilities from sabotage or other subversive acts included the authority to investigate "the ideas or beliefs or reading habits or social, educational, or political associations" of marine personnel -- Schneider v. Smith, 390 U.S. 17, 19, L.ed 2d 799, 88 S. Ct. 682(1968). Thus, as indicated by this case, the jurisdiction of the Commandant of the Coast Guard over marine personnel under either statute or regulation does have well defined constitutional parameters; his discretion in the exercise of his authority is not unbridled.

6. The jurisdiction of the Coast Guard over the employees of contract operators serving aboard public vessels has been traditionally recognized by Military Sealift Command. Subsection (a) of 46 CFR 5.01-35 places all those mariners acting under the authority of license, certificate or document within the purview of the Coast Guard's revocation and suspension proceedings. The regulation defines such an individual as:



"(a) A person employed in the service of a vessel is considered to be acting under the authority of a license, certificate or document held by him either when the holding of such license, certificate or document is required by law or regulation or is required in fact as a condition of employment." (emphasis added)

Since the seamen employed by the contract operators are required to sign Shipping Articles before a Coast Guard Shipping Commissioner in accordance with 46 USC 564 and since the Commissioner insists that each seaman be in possession of a license or document before Articles are signed, such seamen come within the ambit of the regulation. Moreover, in signing the Articles, the seamen generally agree to abide by regulations sanctioned by Congress and authorized by the Commandant of the Coast Guard.

7. There has been some question as to the jurisdiction of the Coast Guard over civil service personnel, especially in view of the fact that seamen hired by the Government are required to have either licenses or documents as an indication of their ability to perform. However, at this juncture, it should be noted that 46 USC 362 exempts public vessels from all provisions of Title 52 of the Revised Statutes which includes the statutes cited in footnote 1, as well as 46 USC 239, the statute authorizing Coast Guard investigations, all of which serve as the statutory basis for the Coast Guard's jurisdiction over seamen. Thus, the requirement that civil service mariners hold licenses or documents is merely an administrative convenience and not a legal prerequisite for employment. 2/ In this matter the Coast Guard is in agreement. The current "Merchant Marine Safety Manual" published by the Coast Guard states that action to suspend or revoke the licenses or certificates of civil service mariners will not be taken unless expressly authorized by the Commandant. That authorization generally will not be forthcoming except upon the request of Military Sealift Command. In any event, even if the Coast Guard on its own volition should decide to initiate an action against a seaman, the proceedings would be severely hampered by 46 CFR 4.11-1, issued pursuant to 46 USC 784, which provides that:

2/ Civil Service mariners are not required to sign Articles as are the employees of contract operators.

"No officer, seaman, or other employee of any public vessel controlled by the Army or Navy (not including the Coast Guard) of the United States, shall be summoned or otherwise required to appear as a witness in connection with any investigation or other proceeding without the consent of the Government agency concerned."

8. The Coast Guard has been most active in initiating disciplinary investigations of mariner personnel. Many times the investigations are requested by masters of merchant vessels. Some of the investigations are instituted by the Coast Guard itself as the result of entries in the official vessel logs which are routinely reviewed by Coast Guard officials when a vessel returns to the United States upon completion of its foreign articles. In fiscal year 1975, 3,154 investigations of merchant marine personnel were held: 278 licensed and 1,309 unlicensed were investigated for misconduct; 238 licensed and 218 unlicensed were investigated for negligence; 45 licensed and 577 unlicensed were investigated for incompetence; 97 licensed and 63 unlicensed were investigated for violations of statutes; 10 licensed and 108 unlicensed were investigated for abuse of narcotics. In fiscal year 1976, 2,973 investigations were initiated; 300 licensed and 1,171 unlicensed were investigated for misconduct; 223 licensed and 187 unlicensed were investigated for negligence; 50 licensed and 494 unlicensed were investigated for incompetence; 90 licensed and 54 unlicensed were investigated for statutory violations; 11 licensed and 160 unlicensed were investigated for narcotics violations. Approximately 30 percent of the investigations that were initiated in both years resulted in no action being taken; 70 percent of the investigations lead to either suspensions or revocations of licenses and certifications. Despite the fact that there are no statistics on the number of marine personnel sailing in one year, the Coast Guard estimates that there were approximately 100,000 active files on marine personnel during the past three years.

9. It should also be noted that by statute, 14 USC Section 2, upon declaration of war or when the President directs, the Coast Guard will be operated as a service in the Navy until such time as the President, by Executive Order, transfers the Coast Guard back to the Department of Transportation. While operating as a service in the Navy, the Coast



M-7/TAM/jij  
1 December 1977

Guard is subject to the orders of the Secretary of the Navy who may require changes in Coast Guard operations in order that they may be made uniform to Navy operations. However, nothing contained in either 14 USC Section 2 or 46 USC 239 would limit or revoke the jurisdiction of the Coast Guard over marine personnel which is conferred by the latter statute when the Coast Guard is operating as a service of the Navy.

*Terence A. McGinnis*  
TERENCE A. MCGINNIS

APPENDIX H  
REFERENCES

- (a) Beans, Bullets, and Black Oil by Rear Admiral Worrall Reed Carter USN (Ret.) U.S. Government Printing Office, Washington, D.C., 1953
- (b) Civilian Manned Support Ships: A View from the Fleet, Lieut. Sidney W. Emery, USN, U.S. Naval Institute Proceedings, April 1977.
- (c) COMSC, Civilian Marine Personnel Instructions, CMPI 750.1-3 dated 9 August 1968
- (d) COMSC letter, Investigation of the Potential for Increased Use of Civilian Manning on Fleet Support Ships, Encl: COMSC Counsel (M-7) memorandum of 14 June 1977, Advantages of Navy Civil Service Manning of Fleet Support Ships Compared to Commercial Contract Manning, dated 28 June 1977
- (e) Department of the Navy, Extended Planning Annex--FY 83 to FY 92 (SECRET), OPNAV-965, December 6, 1976
- (f) Department of the Navy, Five Year Defense Program, Washington, D.C.: Government Printing Office, March 2, 1977
- (g) Department of the Navy, Naval Combat Readiness Criteria, OPNAVINST 3501.2C, dated 11 December 1972
- (h) Department of the Navy, Navy Program Factors Manual, OPNAV-90P-02, July 1, 1976
- (i) Department of the Navy, Office of the Chief of Naval Operations, Pacific and Atlantic Fleet Overhaul Schedules FY-1976-1982, OPNAVNOTE 4710, September 7, 1976
- (j) Department of the Navy, Office of the Chief of Naval Operations, Replenishment at Sea, NWP 38(G)
- (k) Department of the Navy, Required Operational Capabilities Statement (ROC) and Required Operational Environment (ROE); instructions for preparation of, OPNAVINST 3501.3B
- (l) Department of the Navy, Office of the Chief of Naval Operations, Briefing Material for Congressional Committee Hearings, Memorandum OP-10, January 30, 1975

- (m) Department of the Navy, Office of the Chief of Naval Operations, Memorandum No. POM 79-15, Ser 902/82400, January 6, 1977
- (n) Department of the Navy, Office of the Secretary of the Navy, Economic Analysis and Program Evaluation for the Navy Resource Management, SECNAVINST 700.14B, June 18, 1975
- (o) Jantscher, Gerald R., Bread Upon the Waters: Federal Aids to the Maritime Industries, The Brookings Institution, Washington, D.C., 1975
- (p) Judge Advocate General, Ser 13/5492 of 19 May 1977
- (q) Merchant Marine Act, U.S. Code, Vol. XLVI (1936)
- (r) Naval Sea Systems Command, UNREP Master Plan, Red-E Maintenance Strategy, 935U, dated May 1976
- (s) Naval Sea Systems Command, UNREP Station Capabilities Handbook, NAVSEA 0905-487-2010 (First Revision), June 1975
- (t) Law of the Seamen, Norris, Martin J., Rochester: The Lawyer's Co-operative Publishing Co., 1970
- (u) Operational Naval Logistics, Henry E. Eccles, Capt., USN, Department of Logistics, U.S. Naval War College, Newport, RI, Published by the Bureau of Naval Personnel, April 1950, NAVPERS 10869
- (v) The World Almanac and Book of Facts 1977, New York: Newspaper Enterprise Assoc., Inc., 1977
- (w) U.S. Congress, Subcommittee on Merchant Marine and Fisheries, Report to the U.S. Flag Merchant Marine by Hon. Thomas N. Downing, Chairman, Ser. No. 94-M, Washington, D.C.: Government Printing Office, 1977
- (x) U.S. Department of Commerce, U.S. Maritime Administration, Office of Maritime Manpower, Deck and Engine Officers in the U.S. Merchant Marine: Supply and Demand, 1974-1984 (Draft), Washington, D.C., September 30, 1976
- (y) U.S. Department of Commerce, U.S. Maritime Administration Office of Maritime Manpower, Merchant Marine Officer Training (Draft), 3rd Series, Washington, D.C.: Government Printing Office, (circa. 1977)

- (z) U.S. Department of Commerce, U.S. Maritime Administration  
U.S. Merchant Marine Data Sheet, Washington, D.C.:  
Government Printing Office, April 1, 1977
- (aa) U.S. Department of Commerce, U.S. Maritime Administration  
Office of Ship Construction, The Evolution of Shipboard  
Accommodations and Habitability Standards on U.S. Mer-  
chant Ships, Charles B. Cherrix and Eugene L. Coffman,  
Washington, D.C., 1975
- (bb) U.S. Department of the Navy, Navy Program Factors Manual  
(OPNAV-90P-02), revised 1 July 1976, Vol. I
- (cc) U.S. Department of the Treasury, Internal Revenue Service  
1977 Federal Withholding Tax Tables, Washington, D.C.:  
Government Printing Office, 1977
- (dd) U.S. Naval Logistics in the Second World War, Duncan, S.,  
Ballantine, Princeton, N.J., Princeton University Press,  
1974
- (ee) Underway Replenishment Station Reduction Study, Naval Ship  
Weapon Systems Engineering Station, Port Hueneme, CA,  
November 1974

FOR OFFICIAL USE ONLY

U182360

DUDLEY KNOX LIBRARY - RESEARCH REPORTS



5 6853 01000995 4

Shelved numerically in the vault

FOR OFFICIAL USE ONLY